

• Musings from William Gibson,
author of Neuromancer

• Top 10 places
you want to work

• The
“dormpreneurs”

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COMPUTERWORLD

October 31, 1990

Volume 3, Number 1

Computer Careers



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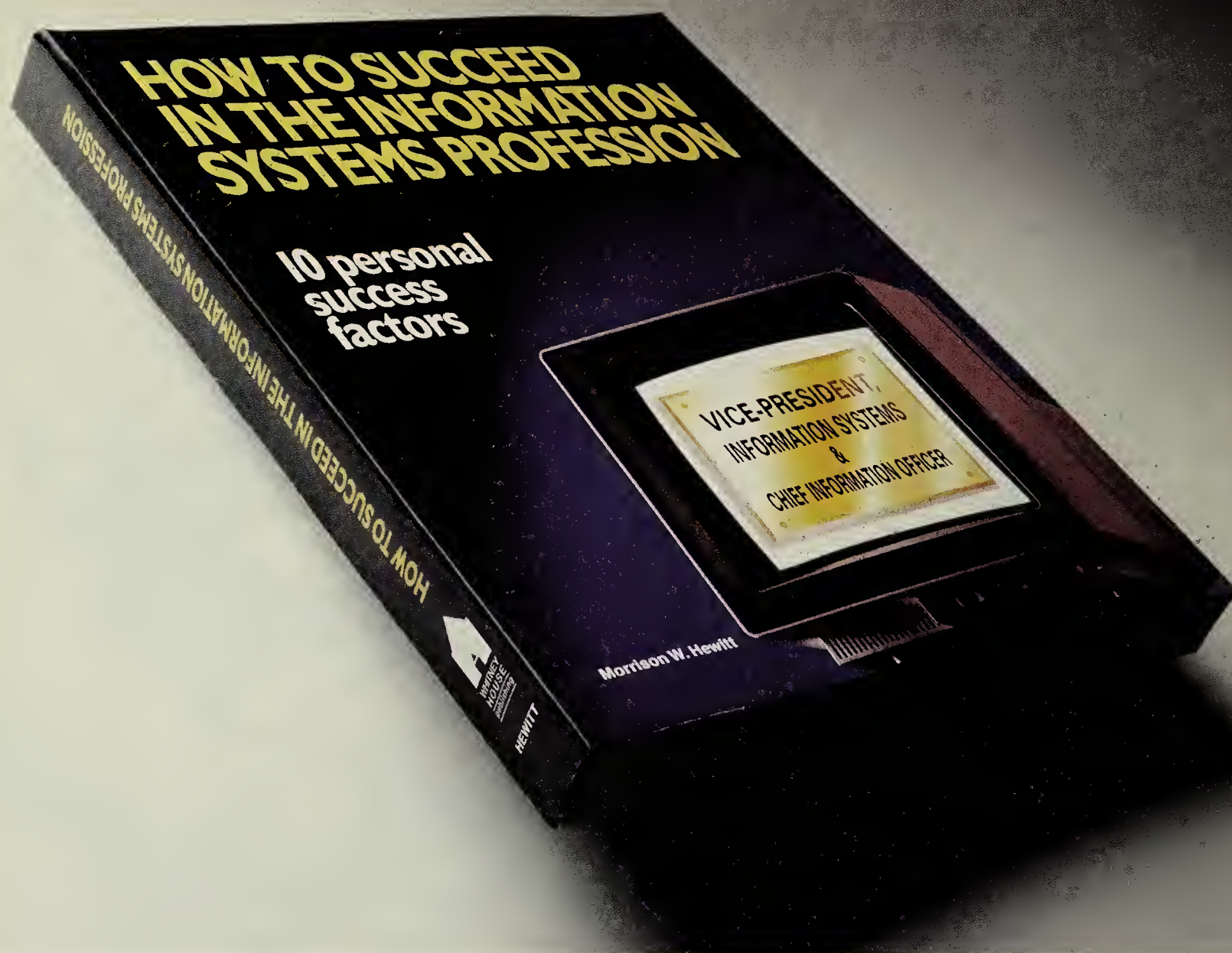
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EDITOR'S NOTE



RANDY LYHUS

A new school of thought

Harvard Business School grads don't go into information technology as a career. So says Warren McFarlan, a noted information technology guru who happens to teach there. Often saddled with \$65,000 in debt after completing two years at the B-School, these hot properties find more lucrative callings in marketing, general management or investment banking.

Let's call a turnip a turnip. Harvard or Stanford or Chicago grads look down on careers in information systems. Despite all they've heard and seen, they still believe IS is for techies. That is sad and a bit ironic, because these CEO wanna-bes are missing a critical point: Technology has already changed, quite dramatically, the way corporations do business. The next generation of business talent will have to be heavily steeped in technology, or it will fail.

Proponents of MBA programs designed to create general managers argue that they include courses on IS in their curricula so that graduates have a good grasp of the importance of technology. But only a couple of years ago, places such as Stanford and Harvard offered just one or two courses in technology within their graduate programs, and there is little evidence that much has changed lately. One or two courses do not a guru make.

All of which leaves a very interesting opportunity for all of you technol-

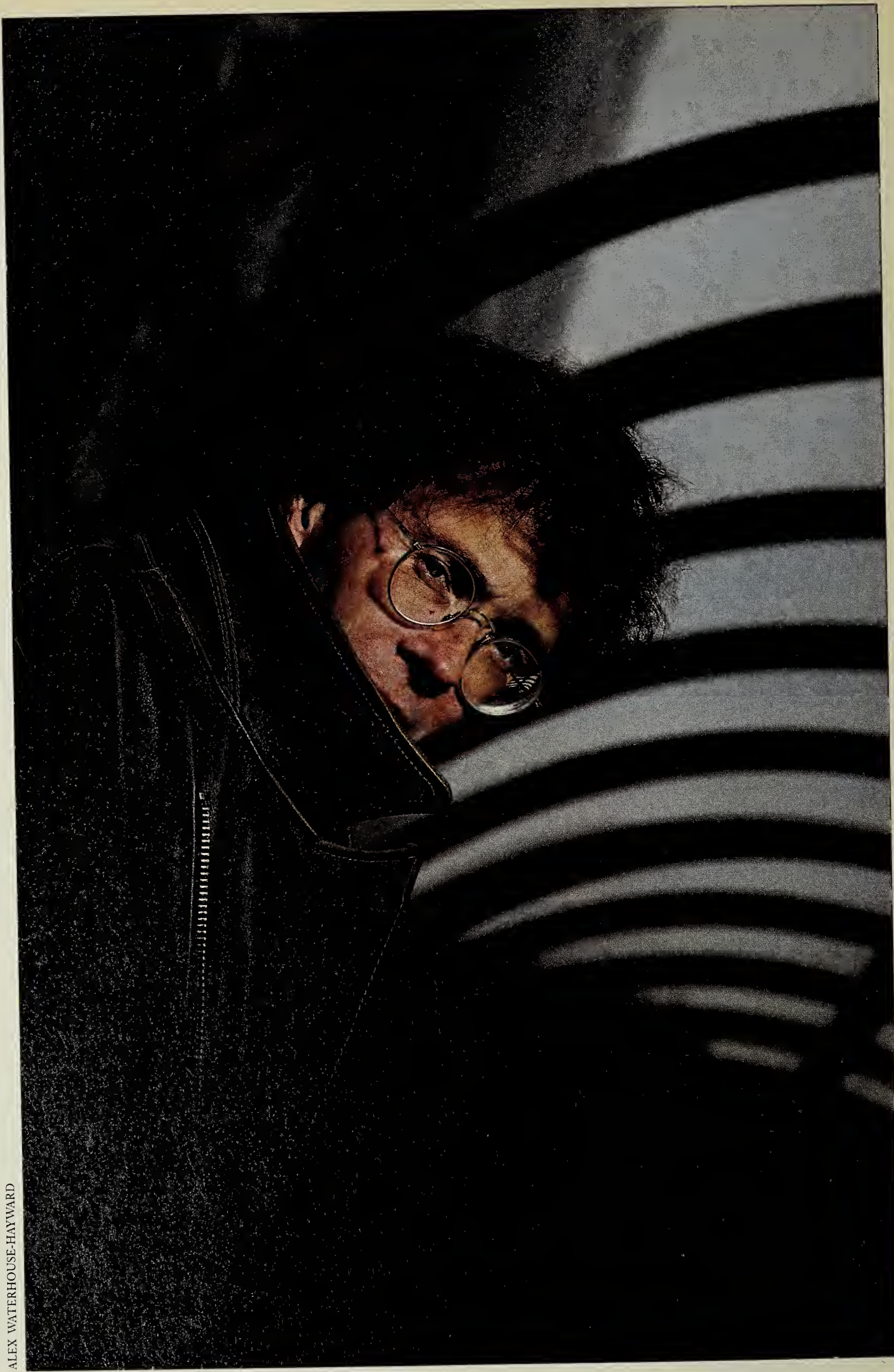
ogy types who want to find rewarding jobs with clout. A solid grounding in business and technology is quickly becoming a ticket to a fast ride up the corporate ladder, even though the chief executive officer suite remains an elusive destination.

The business landscape has seemingly changed overnight, and firms face challenges that were heretofore just concepts in journals. The 1990s corporation must search out where technology can be leveraged to create market strength and must have the people inside who can implement it.

It isn't enough to just know the technology buzzwords. A true grounding in the implementation of technology can only be achieved by getting down and dirty in the trenches. You may not have to be a programmer/analyst, but your understanding of networks, communications and systems could make you an invaluable resource for marrying business applications with strategic technology.

Now the Harvard grads will take up this challenge and point out that CEOs don't come from IS. And you can snort and grumble. Or you can simply smile and say, "Not yet."

ALEX WATERHOUSE-HAYWARD



CYBER SPACE '90

Neuromancer author William Gibson explores the final frontier

I was born in 1948 in the Late Dawn period of the Information Age. I knew environments in which there was no television. My childhood was strongly colored by rampant technological optimism and a concomitant undertone of abiding dread. The two poles of the mass imagination were a glittering futuropolis, slick as Johnson's wax, and the shadows of the nuclear wasteland. I was constantly told by various authorities that the Atom would Change Everything. (Somewhat later, if less officially, I was told the same thing about LSD.)

I saw the world, then, much as I see it now — as the ultimate science fiction scenario. But the science fiction I grew up with was about technology as its makers would have had us receive it. The future would arrive on a stainless platter, probably of Scandinavian design, to be in-

stantly and obediently taken up by Americans of my generation — to be, it went without saying, applied to the purpose for which its manufacturers had intended it.

The science fiction I grew up with was seldom about garbage. Nor was it often about the messy and fascinating uses the human animal finds for the things that arrive daily from the uncouth factories of a world that sometimes fancies itself postindustrial. But the stainless platter is gone, replaced by a stream of cardboard-backed bubble packs. There is no particular end in sight and The Street, home to that messy human animal, persists in finding its own uses for things. (We have it on reliable authority that Colombia's coke barons employ expert systems to route the global flood of their product. . .)

My own science fiction has tended to be about garbage, the re-

fuse of industrial society. We swim (and sometimes sink), after all, in a sea of the stuff. We also swim, some of us, in largely uncharted seas of information, sustaining the very monsters of my bread and butter: the Outlaw Hacker and the Great Big Corporation. When I wrote *Neuromancer* in 1983, "hacker" had not yet acquired its current freight of negative value. Hackers were obsessive, super-bright boffins who delighted in worming their way as far into the texture of the emerging data matrix as possible; they were sometimes, in fact, the very same techie folk heroes who brainstormed the personal computer into being, some few of them even managing to become Great (or at least Pretty) Big Corporations in the process. To hack, in the original sense, was not bad; to hack was to *be there*.

Be where? Cyberspace. Not the neural-jacked fantasy purveyed in

those paperbacks of mine. Rather, in the altogether more crucial version of the concept as currently championed by John Perry Barlow, Mitch Kapor and the Electronic Frontier Foundation: the totality of information existing in the matrix *right now*. Because cyberspace, as I've been muttering for years, is already here. Or rather, we are already there and have been for some time.

This is difficult for some of us to see, likely because we're more used to technologies that open pre-existing territories. Cyberspace, in Barlow's sense, is a territory *generated* by technology. As such, the "territory" itself is subject to constant growth and permutation — a cybernetic Wyoming writhing in some eerie interstice between concept and silicon. Yet real, surely, because we can be roused by the Secret Service for crimes alleged to have been committed there.

And now, teetering on the brink of a new world order/chaos theory, apparently having arrived just in time to describe the global political situation, we are told that Virtual Reality technology is about to Change Everything. The video helmets and data gloves of VR are our current hot tickets to the future.

But the future has junkyards, where one day even the hottest machines must be left out in the rain to rust. All technology eventually gathers dust. What matters is territory, and in its generation of territory, the advanced technology of information is unique. The territory is there, awaiting partition. Fascinating as the potentials of

Cyberspace is a territory generated by technology subject to constant growth and permutation — a cybernetic Wyoming writhing in some eerie inter- stice between concept and silicon.

VR may be, I'm more impressed by the Kaporian metaphor of the electronic frontier.

Cyberspace, today, seems just that — a virtual frontier sparsely inhabited by technical pioneers: loners, visionaries and even outlaws, all of them willing to live off the land. Both the hacker and the corporation (let us include governments and military entities) have been aware of the territory, in some sense, from the beginning — the hacker, by nature of his being, and the corporation, by virtue of its need to define itself.

The first hackers were, in many instances and quite literally, creators of the territory they explored; as such, they were necessarily possessed of a certain edge. But the railroad is no doubt on its way in the form of the Great Big Corporation, and

with it will come what my colleague Bruce Sterling has called the Planned Development of Hyperreal Estate. The proto-hackers of the 1970s may one day be remembered as cybernetic mountain men, the earliest settlers in a landscape long since dominated by data malls and information megamarts.

Or perhaps I'm merely being romantic; perhaps the mall, the dominant structure of our economy, is already firmly in place. In the data mall, the majority of users go about their business in the most ordinary way. Most, in fact, are as yet unaware of the mall itself and see only their own specific destinations and the functions they must perform there. Amid these good and ordinary folk of Cyberia, however, there may sometimes be found exceptions: spies, vandals, voyeurs, terrorists, artists and combinations thereof. But these others have one thing in common, if nothing else: They are aware that there *is* a mall. (Though our data mall currently differs from the concrete and glass model in one minor, but perhaps crucial, specific: Scattered amid the chain stores and fast food franchises are meeting places of an almost European intimacy — nonprofit hangouts of hair-down boho splendor. These are bulletin boards, and our "other users" are prone to spend a good bit of time there.)

Myself, I'll stick with garbage, because my real business has less to do with predicting technological change than making evident its excesses. I'll stick with the poetry inherent in reels of magnetic wire recordings, rusting under a sun-faded card table at a California swap meet. We may not actually recall the machines required to summon voices from these brittle yards of steel, but there's an appealing melancholy in the fact that the vendor is unaware that these *are* recordings. All those voices. Other days, other days.

And one day our floppies will lie there by the millions, warping and gathering dust, not to mention that svelte laptop you've just decided on.

Meanwhile, I'd advise those of you so inclined to definitely go West. It's either El Dorado or a shopping mall — same as it ever was, somehow.

Linz, Austria/Vancouver, B.C.

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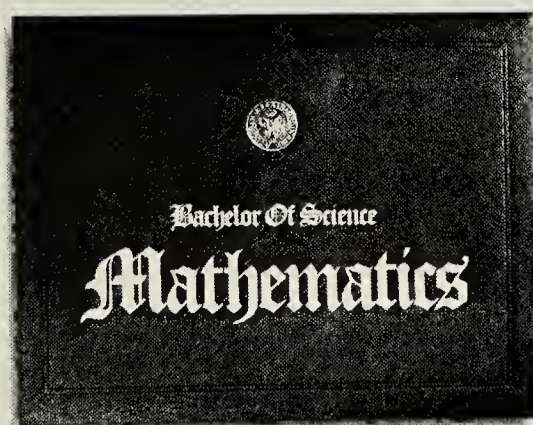
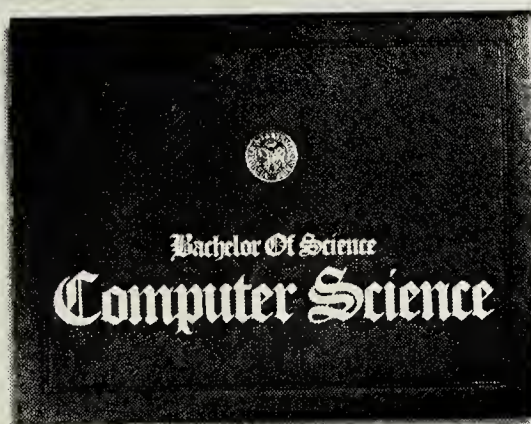
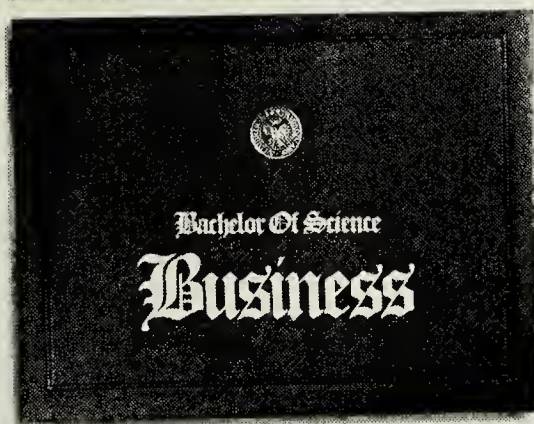
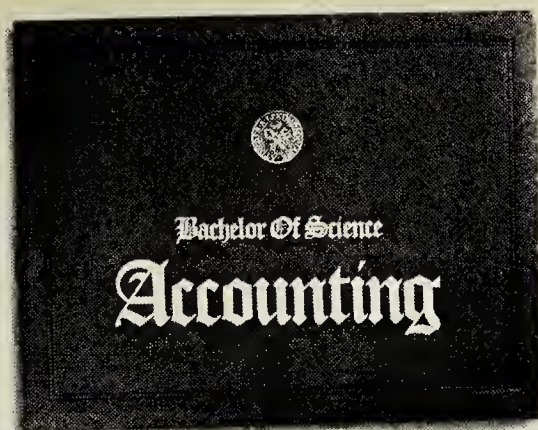
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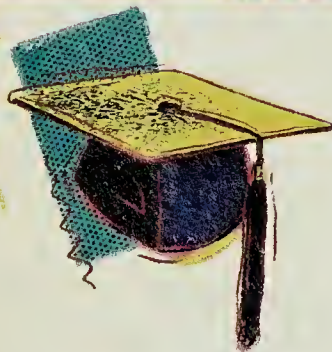
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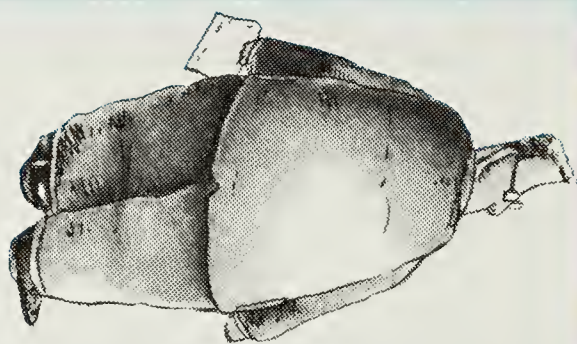
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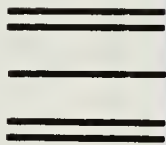
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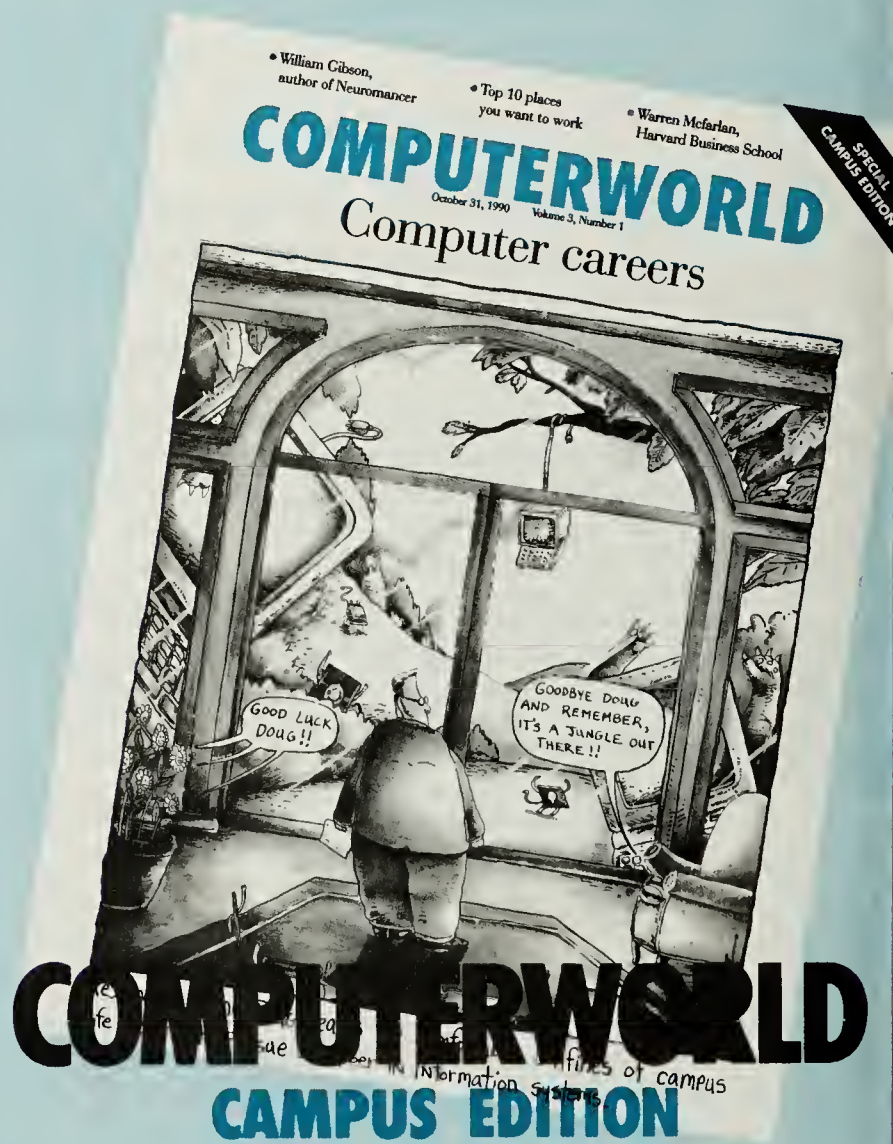


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DREAM JOBS

Where you
want to work,
and why

By Sheryl Kay

If you had your druthers, where would you like to work? *Computerworld* posed that question to 800 students in information systems, computer science and electrical engineering programs around the country and came up with a list of the Top 10 companies. Traits the students looked for among potential

into the Top 20.

Hal Sullivant, president of the systems recruiting firm Linn-Truett, Inc. in San Antonio, Texas, believes this may be largely because of name recognition. "They see advertisements in journals; they are staring at hardware and software with these companies' names all

Big Blue as their top choice.

"IBM is the pacesetter," explains Angel Mays, who is currently working toward a bachelor's degree in computer science at Franklin University in Columbus, Ohio. "When it takes the lead, everyone else follows," she says.

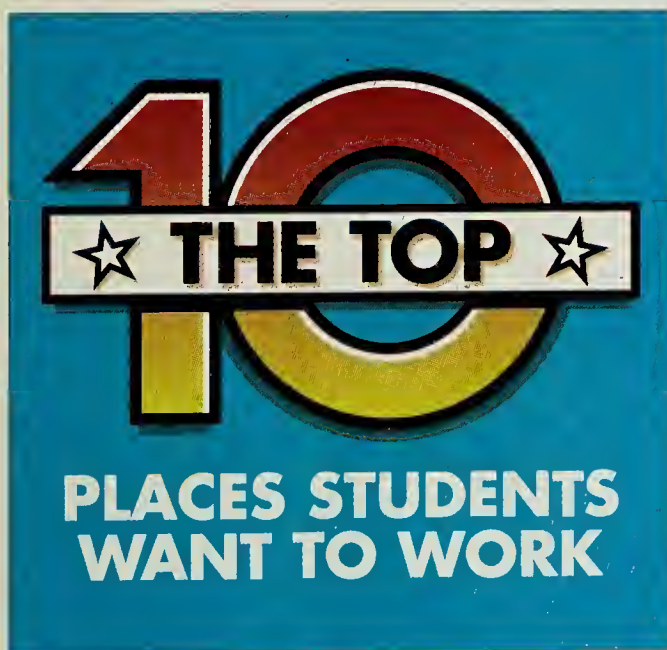
While IBM will hire fewer col-

lege students than usual in 1990 to maintain its policy of no layoffs, college recruiting will be back up in 1991, according to Lee Covert, manager of IBM's national recruiting organization based in Purchase, N.Y.

The company is looking for hires with bachelor's degrees in computer science, electrical engineering, mathematics, accounting

and business.

"Students coming to work for us will work with leading-edge technology, in small teams and with a diversity of assignments," Covert says. For Mays, that job description sounds just right: "I love making that bucket of bolts do what I want it to do."



1. IBM	497
2. AT&T	342
3. Hewlett Packard	191
4. DEC	134
5. Apple	101
6. General Electric	95
7. Motorola	85
8. Arthur Andersen/ Andersen Consulting	65
9. Microsoft	64
10. Intel	51

Total responding: 772

(Students were asked for their top five choices; the list reflects the total number of mentions of each company.)

Source: *Computerworld*

employers included opportunities for further education and training, a global corporate outlook and meaningful responsibilities.

Interestingly, all of the Top 10 companies are in some way involved directly with the business of technology. No banks, insurance firms or retail companies even made it

over everything," Sullivant says. Students are constantly being bombarded with information about these companies and their reputations while in school.

Here are profiles of the Top 10:

#1: IBM

Well over half the students listed

STUDENT PROFILES



George E. Klimes

Age: 26

► **B.S., biology, computer science minor, Georgetown U., Washington, D.C. Working on master's, computer science, George Mason U., Fairfax, Va.**

► **"I'll be teaching intro to computer science this fall at Georgetown, but I also have a part-time computer consulting business."**



Richard Pyra

Age: 26

► **B.A., computer science and math, Rhodes College, Memphis. Working on MBA, finance and IS, University of Rochester School of Bus. Admin., N.Y.**

► **"My goal is to secure a partnership with a consulting firm or become a divisional manager with a technology firm or group."**

#2: AT&T

"I'd like to help them come up with newer and better telecommunications hardware," says Raymond Papp of Farmington, Conn., describing what he would do if offered a job by AT&T.

While working toward his master's in business management at Central Connecticut State University last year, Papp wrote a paper on AT&T's signaling system. "I found AT&T to be an international pioneer in the field," he states.

Recent graduates are attracted to AT&T because of its worldwide product and services reputation, says Gale Varma, manager of corporate college recruiting for AT&T in Morristown, N.J.

"We are a global company with projects of international scope, and global is in with the students today," she says.

Varma forecasts approximately 2,000 new college graduate hires in 1991, with an even mix of undergraduate and advanced degrees who will work as software developers and systems engineers. Most college recruiting is done on campus; however, Varma says, her office receives more than 200,000 inquiries per year.

#3: Hewlett-Packard Co.

Students who seek a team-oriented environment yet desire an opportunity to express their individual creativity would feel right at home with HP, says Kathy Burke, the company's national college relations and recruiting manager in Palo Alto, Calif.

Burke estimates that in 1991 HP will hire 600 college students with degrees in computer science, electrical engineering, mechanical engineering, industrial engineering and business administration.

According to Burke, HP has a unique, informal management style as well as a commitment to the community in which it resides.

For Eli Robinson, a first-year MBA student at the University of Vermont, that HP philosophy is in line with his future goals. Robinson, who is interested in sales, says he would like to work for "a company that puts out quality products because I'll be selling directly to the end user, and it's important to represent something that won't come back to haunt me."

Through conversations he has had with acquaintances who work for HP, Robinson has learned that HP projects are worked on by small groups of people — something he finds attractive.

#4: Digital Equipment Corp.

DEC's presence on campus leaves a lasting impression, according to Deann Sklenak, personnel consultant in DEC's college program office in Maynard, Mass.

"Many students have worked extensively on our VAXs at school," Sklenak says. Such experience tends to influence students to look to DEC upon graduation, she adds.

Alec Berenbaum agrees. Having worked with DEC equipment and service personnel, Berebaum,

who is currently pursuing an M.S. in computer science at Rochester Institute of Technology in New York, gained respect for the firm as one of the leaders in networking. It's one of his top choices for employment.

As with many companies in the Top 10, DEC offers staff career paths in technology or management. Sklenak emphasizes that the two ladders parallel each other; in fact, employees may go back and forth between the two as well as change divisions.

#5: Apple Computer, Inc.

Headquartered in sunny Cupertino, Calif., the "Apple campus" is described as casual and laid back, "an easy transition from college," says Apple college relations staffing specialist Ron Jennings.

Rob Sabey, of Rock Hill, S.C., learned from friends who were interns at Apple that new hires were given project responsibility from day one.

"If the opportunity were right," says Sabey, who just completed his MBA at Brigham Young University in Provo, Utah, "I'd want to work with [Macintosh] networks in corporate MIS."

"Mac programming is highly sought after," Jennings notes; however, he says, it "is not necessarily more important than a good mainframe background." Many students who are ultimately hired at Apple have gone through a summer internship with the company, he adds.

Jennings also stresses that students will find Apple to be strongly committed to diversity in the work force. Women and minorities will feel very much at home there, he says.

#6: General Electric Co.

Noting that the number of individuals entering IS programs may be shrinking, Randy Johnson, manager of GE's IS management program in Bridgeport, Conn., says it's important that students "regard us as one of the best."

For Dahong "David" Qian, working for the company he considers the best is a major reason he'd like to work for GE. Now working toward a master's degree in mechanical engineering at the University of Texas at Austin, Qian's knowledge of GE comes mainly from his uncle, who is currently employed as a chemical engineer at GE in Albany, N.Y.

"He described it as an exciting place to work, where you are teamed up with senior employees, so you learn a lot. He says you are given the chance to achieve personal ambitions," Qian explains.

In fact, training is one of GE's major drawing cards, Johnson says. Through a combination of classroom and on-the-job training, new hires are able to continue to develop the skills that they learned in school.

In 1991, Johnson anticipates that GE will hire approximately 80 students for the IS management program, the majority of whom will have bachelor's

Continued on page 12



Computer science major Cary Cannova made an intelligent choice when he joined Amoco. **B**ecause right out of school, he's involved with a cutting-edge information management system that's changing the way we do business. **T**he project is EPICS (Electronic Processing of Information, Cash and Sales), and it's taking our 3,500 service stations from a paper environment to a fully electronic network. **O**ne smart enough to automatically record sales, monitor inventory, activate pumps, even

access an expert "help" desk. **E**PICS gives Cary a programming challenge that integrates all aspects of the company, from Accounting to Marketing and Sales. **I**t also connects him to every community where Amoco retails. **B**ecause EPICS can flag underground tank leakage. **I**t's the safest detection system yet. **I**f you want to work not just with data but with important human considerations, choose Amoco, and help make the world a more intelligent place.

"I'm helping create a network of stations as intelligent as this one."



Amoco Corporation
Choose the big business that makes a big difference.



Continued from page 10

degrees in computer science, business or math. The Edison engineering management program in Bridgeport, which requires students to have a degree in electrical or mechanical engineering, will have at least as many openings for grads.

#7: Motorola, Inc.

Anna Dorfman, a recent graduate of the University of Illinois in Chicago, now works for Motorola as a programmer/analyst in the company's Manufacturing Business Systems Division. For her, Motorola's educational opportunities and international status were important.

Tuition reimbursement was high on Dorfman's list in finding an employer. "I want my master's degree, and Motorola offers 100% paid tuition," she says.

In addition to training, Motorola gets student hires involved in a meaningful project right from the start, says Tunnice Glass, manager of professional and technical recruiting at Motorola's headquarters in Schaumburg, Ill. "We offer a variety of work assignments, from semiconductors to general business systems to cellular telephone pagers," Glass says.

The firm's global nature also grabbed Dorfman's interest. "With different operations around the world, I would have the ability to move around," she observes.

#8: Arthur Andersen & Co./Andersen Consulting

Continued training is what Alan Yong was looking for in a new employer. It is also what this May 1990 graduate with a bachelor's degree in business administration in

MIS from the University of Oklahoma had in mind when he put Andersen Consulting on the top of his list.

"A good friend of mine working there, as well as a recruiter who came to our campus, described Andersen's training program as being the best in the business," Yong says.

Through its worldwide education center based in St. Charles, Ill., Andersen Consulting provides each employee with training, according to Mike Noling, the company's managing partner of operations support in Los Angeles.

Furthermore, new hires get responsibilities from the beginning. With Andersen Consulting's systems integration focus, individual staff members are involved in a variety of assignments. "Consulting," Yong says, "would provide me with the challenge of solving a variety of systems problems, while enabling me to keep current on what's happening in the field today."

#9: Microsoft Corp.

Victor Gurule of San Louis, Colo., pinpoints Microsoft as a "computer science-type company" and as a place he'd like to work.

"I've heard it's a very laid-back technical environment, where you get thrown right into a project, and it's easy for bright computer engineers to advance," says the May 1990 computer science graduate from the University of Colorado.

"Each new student hire does have a tremendous amount of responsibility from day one," says Julie Walker, senior technical recruiting manager at Microsoft. "New

employees can make an impact right up front, knowing that the product they've worked on will reach a market of millions of people," she says.

Microsoft's Redmond, Wash., headquarters is a relaxed setting that includes fountains and gardens. Employees are offered extremely flexible work hours, and there is no dress code.

If he were hired, Gurule says, he would want to work either on a Windows or operating system project at Microsoft.

Promotion at the company is based on performance, Walker says, and employees can take a management or technical track.

#10: Intel Corp.

The ability to blaze your own trail, says John Moore, program coordinator for corporate college recruitment at Intel, is luring many students to Intel. "Supervisors may watch what you do, but you're given the opportunity to succeed, rather than looked upon as taking a risk to fail," he says.

Students are put to work on "very live projects," sometimes in the first week of employment, Moore adds.

For Suber Patel, who is working on a master's degree in electrical engineering at the University of Wisconsin, attending an Intel open house brought that point home. He listened to speaker Ming Ling, who had graduated from the university a year before. "He was already one of the main product design engineers for the 1860 chip," Patel observes.

Moore estimates that Intel will look to hire approximately 400 students in 1991, half with undergraduate degrees and the rest with master's degrees and Ph.Ds. Moore will be looking for graduates who have specialized in any of several disciplines, including electrical engineering, computer science, material science, chemical engineering, physics, finance and accounting.

Once Patel completes his master's degree in electrical engineering, he plans to begin studies toward his MBA. "I'd like to be in one of Intel's technical groups, such as the VLSI group, but I'm also interested in marketing. An MBA will come in handy," he explains. ◀

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

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JULIA TALCOTT

INTERNSHIPS:

If you're an information systems student waiting in line to register for next semester's courses, you may want to consider signing up for an internship to supplement your classroom learning. Some of you may not have a choice; internships are required in many IS programs.

"School is great for a surface knowledge of IS, but to know what you're actually going to do when you get out there, you need an internship," says Cheryl Smith, a senior MIS and marketing student at New York University. Smith spent last summer doing an internship at Citicorp in New York in the international division of the bank's Consumer Services Group. She worked with the design and development group, which was developing an international network to link all of Ci-

How they can work for you

By Kelly E. Dwyer

ticorp's different services together outside of the U.S.

Smith joined the company at the beginning of the project and was heavily involved in the documentation process, which required her to address user needs and prototype interfaces.

"I can't believe how much I learned," she says. "When I came back to school, it gave my classes so much more meaning."

Besides taking their experience back to the classroom, many students use it to help them get permanent jobs when they graduate.

"My internship made the transition into the 'real' world easier," says Meera Panchal, who now works as a project manager at Bose Corp. in Framingham, Mass. Panchal's relationship with Bose, a maker of loudspeakers and electronics equipment, began with a project team she worked on while obtaining her MIS-oriented MBA from Boston University in 1986. "It was a way to show potential employers that I wasn't shut off from

the real world for a year and helped convince them that I could do it."

Advocates of IS internship programs claim that internships help students learn what the working environment is like and give them a broader perspective than their academic curriculum provides.

"The internship experience is at least as great as any class you can take," says Steve Shankman, a University of Arizona MBA student who completed an internship at American Express Co. in its performance engineering and human resources department. Shankman's responsibilities ranged from helping people put together form letters to writing a program to tabulate the responses from an ongoing attitude/opinion survey that employees complete to measure the quality of the work environment.

"I was more of a consultant than anything else," he says. "I created databases and consulted with users who were having problems."

Eric Birchfield at the University of Texas at Austin had a similar experience at Coopers & Lybrand in Dallas. "I saw it as a chance to check out the consulting environment," he says. As a result of his experi-

ence, Birchfield says he understands systems analysis and design better. In one project that he worked on, "no one knew how to run a product, how to use it or what it could do. I learned it, trained some staff [members] on how to use it and gave a presentation to upper management about what the product did and was capable of doing."

Besides learning from his experience, Birchfield says he was able to contribute rather than just feeling like an extra body.

A REAL JOB

Internships are also valuable from the perspective of those who oversee such programs. "It's my job to make sure that the internships are true work experiences, not just summer jobs," says Domenick Cama, a technical associate program manager at Citicorp's New York technology office. "The students work with all different hardware and also do a lot of different analytical work."

Cama says the number of internships at Citicorp has been steadily increasing during the past couple of years, a trend he says he feels is a measure of the success of internship programs. He also attributes the

increase to the high quality of education many interns now receive on campus, where state-of-the-art equipment is finding its way (see story page 43).

"It's educationally important for students to be able to practice the skills they've used in class," adds Jack Baroudi, associate professor at the Stern School of Business at NYU. "It's not as easy in the real world as it is in the classroom."

Internships often lead directly to jobs. Citicorp hires close to 50% of the students who start as interns.

AT&T also hires interns with the intention of offering them full-time positions when they graduate. "It really reduces our recruiting costs," says Evangeline Noble, a personnel services specialist and recruiter at AT&T's Guilford Center location in Greensboro, N.C. "If the student has a positive experience, [he passes] that along, which helps to generate business back on campus."

Besides finding out about internships on campus, some students pursue them on their own with companies they've always wanted to work for. Miro Perez, a senior at the University of Texas at Austin, targeted

We're looking for seniors who like



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Apple Computer, Inc. He sought contacts through the school's placement office but got in touch with them on his own. He was offered two internships at the firm after interviewing with Apple representatives.

Perez chose a job in the development and technology department at Apple's Integrated Systems Division because he thought the area was at the leading edge of technology. His duties included developing a database program and working on mainframe-to-Macintosh connections.

He was also involved in a database project prototype, which Apple says it is planning to implement soon. "I can tell future employers, 'I did this and it's being implemented,' " he says. "That's a real plus."

Internships may indeed be the single most important item on a resume. "The company wins because it gets good help for the summer, and the students win," says Jeff Hoffer, chairman of the IS department at Indiana University. "We win because it's good for our program." ◀

Dwyer is a former *Computerworld* intern who now works as a CW copy editor.

Experiencing your ideal internship

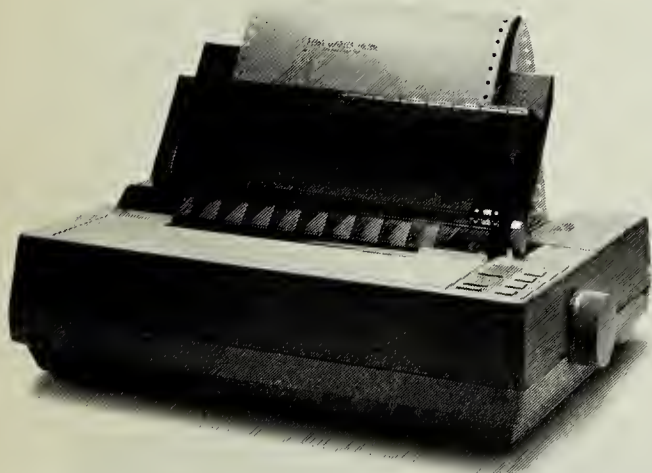


eterans offer these tips for landing a great internship and making the most of it:

- Don't stick to just one source in searching for an internship. Check your school's IS department, career placement office and job postings. Also, ask professors and friends if they know of any opportunities.
- Meet company representatives personally if they visit your campus.
- Look for something in your specific area of interest. Employers will want to know that your internship was more than a way to earn summer money.
- Keep trying! The perfect opportunity may not fall into your lap.
- Study hard. Know your field well enough to work on projects that will tangibly benefit your employer.
- Look for a mentor. Pairing up with a permanent employee is a great way to learn.
- Don't be discouraged or intimidated by new problems. Supervisors understand that you are there to learn.
- Seek monthly reviews with your supervisor. If your only review is at the end of your internship, you will not have any opportunity to correct your mistakes.
- Get to know as many people as possible. Your internship can provide you with valuable contacts for the future.
- Be aggressive! Go beyond your assigned responsibilities. "You have the latitude," one former intern says, "to do some things people in the company can't because they are bogged down in the details of their work."

DEREK SLATER, *COMPUTERWORLD* INTERN

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The long, hard climb

Career paths of 10 high-level IS executives

By George Harrar

In the mid-1960s, Michael Simmons was a biology teacher at Arsenal Technical High School in Indianapolis. Now, at age 50, he is executive vice-president of technology and operations at Bank of Boston, the head of a 2,000-member organization.

Charles Carlson, who in 1954 received a bachelor of arts degree in English literature from the College of St. Thomas in St. Paul, Minn., today oversees the delivery of information processing and voice/data communications to the business units of retailer Sears, Roebuck and Co.

Rick Adam graduated from West Point in 1968 and headed into

the Air Force for five years. Five jobs later, he presides over the global operations and information technology department at financial company Goldman, Sachs & Co.

The profession now known as information systems barely existed 30 to 40 years ago when many of today's chief information officers left college looking for work. Without any role models to follow — or long-term plans in their heads — they set off in the various directions that ended up inside the CIO's office.

Carlson, for instance, started at Sears as a part-time salesman during high school in 1948 and has been

there ever since. He was working on his doctorate in English literature with plans to be a professor, "but I was offered the opportunity to be a department manager at Sears, and the pay was \$5,400 a year. A friend of mine had just gotten a Ph.D. at Harvard and was getting paid \$5,000 to teach at the University of Iowa." Based on the money, he says, he decided to stay at Sears instead of teaching.

In 1965, Carlson was sent as the representative of store operations into the systems department, where, as he remembers it, the first fully automatic point-of-sale system was being developed. Living and breathing



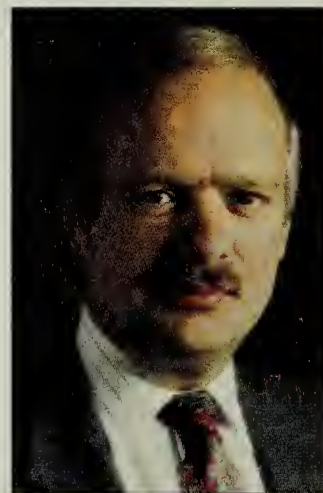
Charles Carlson
VP, tech services
Sears, Roebuck



Rick Adam
CIO and partner
Goldman, Sachs



Susan Mersereau
VP, general manager
Weyerhaeuser



John Ullrick
VP and director, MIS
Playboy Enterprises

data processing led Carlson to move officially into that area in 1969 as manager of the Louisville Retail Systems Research Center.

Unlike Carlson, Adam chose to use one company as a springboard to opportunity in another. He left the military with an engineering degree and gained a reputation as an IS turnaround specialist, moving from FMC Corp. to Litton Industries, Inc. to Baxter Healthcare Corp. When Goldman Sachs management needed to overhaul a moribund systems department, they sought Adam out.

LESSONS LEARNED

Drawing lessons from people at the pinnacle of their careers in 1990 and applying them to today's college graduates can be tough. As IS has matured as a profession, many more options have become available, such as getting a bachelor of science degree in computer science and an MBA in IS or specializing in a nonmainstream technology such as imaging, supercomputing or neural networking.

Yet the impressive resumes of 10 top IS chiefs (beginning on page 18) do reveal some lessons for those whose *curricula vitae* is long on education and short on work experience:

- Liberal arts graduates should not feel that they are necessarily over-matched by job candidates carrying technical degrees.
- The fastest movers in the field are the people who grab every opportunity for advancement, whether it fits in with their career plan or not.
- As vendors continue to build equipment and create software that

functions better, companies will need fewer people with technical skills and more people with the business sense to put the technology to use.

- Working for a vendor firm soon after school can provide valuable insights into technology and important job connections for the person wanting to work at a user firm.

Susan Mersereau, the vice-president and general manager of Weyerhaeuser Information Systems, began her work life as a high school history teacher. She comes from a strong liberal arts background, and when she talks of her interest in languages, she means German, not Cobol and C.

"My education encouraged me to focus on the interrelationships of any problem we were considering," Mersereau says. "I studied history in the context of economics, finances, world affairs, art and culture. In IS today, the biggest challenge is not only to understand the technology as it is evolving but also how it fits with the whole construct of the organization. I'm always trying to integrate the pieces that aren't naturally linked."

People who want to stay on a technical track throughout their careers should probably begin that focus on technology in college, Mersereau says.

However, "if they want to go into the business side of things, then they must learn how to identify what the business problems are and how to apply the technological solutions," she adds.

Mersereau says she feels she ended up in a career that suits her mind-set. She prefers a field such as

information technology in which there is often no right or wrong answer — it's how you put the pieces together to solve a problem.

Although she has become the first female to oversee an operating division at Weyerhaeuser, a Seattle-based wood products company, Mersereau still continues her education. This year, she completed her second master's degree, this one in organizational change at Antioch College in Yellow Springs, Ohio.

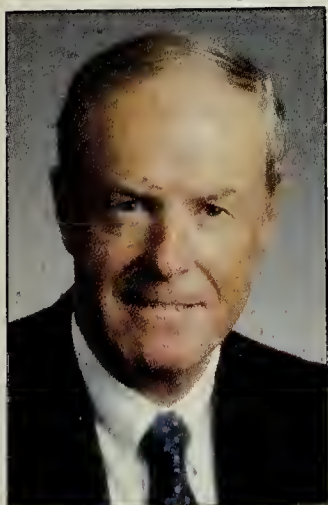
NONTECHNICAL BACKGROUND

John Ullrick, vice-president of MIS at Playboy Enterprises, Inc., studied marketing in college and began his work life as an accounting trainee at U.S. Steel Co. He was promoted to an administrative position in an unfamiliar area — computer operations.

"It was somewhat overwhelming," Ullrick says, "because I didn't even know what a computer was." The technical people working for him needed little guidance, giving Ullrick the chance to slowly learn the complexity that goes along with computer operations.

Today, he shies away from applicants to his staff with unusually strong technical backgrounds, unless they have minored in finance or business. "Our stated business plan is one of growth and acquisition," Ullrick says, and therefore, "I always hire the strong business person because you can teach him the technical side pretty quickly, as long as he has the mind for it. It's much harder to teach a technical person the business

Continued on page 20



James Sutter
VP, general manager
Rockwell International



CINDY CHARLES

Carlene Ellis
VP, administration
Intel



STEVE SAXTON/GAMMA LIAISON

Max Hopper
Senior VP, IS
American Airlines



James Marston
Senior VP and CIO
American President

CHARLES A. CARLSON

EXPERIENCE

1988-present

Vice-president of technology services, Sears, Roebuck and Co.; president, Sears Technology Services, Inc.

1981-1988

Vice-president, information systems and data processing, Sears, Roebuck Merchandise Group.

1980-1981

National manager of the computer and telecommunications services department, Sears.

1976-1980

Territorial manager of the data processing department, Southern Territory in Atlanta, Sears.

1969-1976

Manager, Louisville Retail Systems Research Center in the national data processing department, Sears.

1965-1969

Staff assistant, national retail operating department, Sears.

1957-1965

Management positions, Sears retail stores.

1948-1954

Part-time salesman, Minneapolis Sears retail store.

EDUCATION

Graduate work as a Woodrow Wilson fellow, University of Iowa, Iowa City, 1955-56.

B.A. in English literature, College of St. Thomas, St. Paul, Minn., 1954.

GEORGE F. (RICK) ADAM

EXPERIENCE

1987-present

Chief information officer and partner, Goldman, Sachs & Co. Responsible for the information technology department as well as Global Operations — the firm's worldwide securities, commodities and futures processing capabilities.

1980-1987

Corporate vice-president and chief information officer, Baxter Healthcare Corp. Operated the Information Systems Division and headed a new for-profit division called the Baxter Systems Division.

1978-1980

Associate director of computer systems, FMC Corp. Ran the corporate data centers, telecommunications services and systems development.

1976-1978

Director of computer systems, Litton Industries, Inc.

1973-1976

Sales representative, IBM.

1968-1973

Captain, First Lieutenant, Second Lieutenant, U.S. Air Force. Worked as computer officer and data center manager in the Apollo space program.

EDUCATION

B.S. in engineering, West Point, 1968.

SUSAN MERSEREAU

EXPERIENCE

1988-present

Vice-president and general manager, Information Systems Division, Weyerhaeuser Co.

1983-1988

Director, telecommunications, Information Systems Division, Weyerhaeuser.

1982-1983

Manager of advanced planning and technology, Information Systems Division, Weyerhaeuser.

1981-1982

Program manager, solid wood, Weyerhaeuser.

1978-1980

Director, department of planning research and evaluation, Seattle School District.

1976-1978

Director, department of management information services, Seattle School District.

1971-1976

Research positions.

1970-1971

Administrative assistant, Teacher Corps. Program, University of Illinois.

EDUCATION

M.A. in teaching history, University of Chicago, 1971.

B.A. in history, Scripps College, Claremont, Calif., 1968.

JOHN ULLRICK

EXPERIENCE

1987-present

Vice-president, MIS; director, MIS, Playboy Enterprises, Inc. Oversees staff of 20 charged with finding opportunities to use information processing to help build the company.

1984-1987

Director, MIS, The Pepper Companies

1981-1984

Manager of information systems, UOP, Inc., Signal Resco.

1973-1981

Project leader and senior systems analyst, Automotive Products Division, UOP.

1967-1973

Programmer/analyst, procedures analyst, operations supervisor, accounting supervisor and accounting trainee, U.S. Steel Corp.

EDUCATION

B.S. in marketing, University of Illinois, 1967.

JAMES F. SUTTER

EXPERIENCE

1983-present

Vice-president and general manager, Rockwell International Corp.

1980-1983

Director, corporate information management, Xerox Corp.

1975-1980

Director, corporate information systems & telecommunications, Xerox.

1974-1975

Manager, administrative business operations, Xerox.

1971-1974

Manager, international planning, Xerox.

1970-1971

Manager, systems architecture & control, Xerox.

1967-1970

Manager, manufacturing services, Xerox.

1966-1967

Manager, data processing, Iowa Beef Processors.

1961-1966

Management trainee and manager, data processing, Rexnord, Inc.

EDUCATION

MBA in finance and business administration, Marquette University, 1970.

B.S. in finance, University of Notre Dame, 1959.

CARLENE M. ELLIS

EXPERIENCE

1987-present

Vice-president, Administration Group, Intel Corp. Corporate officer since 1989.

1985-1987

Director of corporate information services, Intel.

1980-1985

Head of planning and control function in corporate information services; manager of application systems and director of marketing services, Intel.

1976-1980

Manager of information services and other information systems management positions, Fairchild Camera and Instrument Corp.

1973-1976

Assistant IS officer and other data processing positions, city of Jacksonville, Fla.

1971-1973

Applications programmer, Western Electric.

1969-1970

Engineer, Western Electric.

EDUCATION

Postgraduate work at University of Georgia and University of Alabama.

B.S. in mathematics, University of Georgia, 1969.

MAX D. HOPPER

EXPERIENCE

1985-present

Senior vice-president, information systems, American Airlines. Spearheads and supervises the systems efforts of the airline and its parent, AMR Corp.

1982-1985

Executive vice-president, Bank of America.

1980-1982

Vice-president, data processing and communications services, American Airlines.

1972-1980

Assistant vice-president, marketing automation programs, and director of Sabre reservations system, American Airlines.

1970-1972

Director, Unimatic computer systems, United Airlines.

1967-1970

Consultant on automated systems, Electronic Data Systems Corp.

1958-1967

Positions in research department, Shell Oil Co.

1953-1955

Positions in research department, Shell Oil.

EDUCATION

B.A., University of Houston, 1960.

JAMES MARSTON

EXPERIENCE

1987-present

Senior vice-president and chief information officer, American President Companies Ltd. Also president of American President Systems Ltd. Responsible for all of information systems, computers and communications for this \$2.3 billion international shipping, stack train and truck company. Oversees a staff of 450.

1986-1987

President and chief operating officer, AMR Corp. Technical Training. Directed the start-up of this major American Airlines affiliate, which provides high-technology training.

1982-1986

Vice-president, data processing and communications services, AMR.

1972-1982

Officer positions, U.S. Air Force, including assistant deputy chief of staff, data systems; director, computer applications; deputy assistant for data automation, Europe; deputy director of computer resource planning; and division chief, computer applications.

1956-1972

Operational and computer assignments.

EDUCATION

M.A. in public administration, University of Oklahoma, 1970.

B.A. in political science, University of Maryland, 1955.

ROBERT J. FETTEN

EXPERIENCE

1988-present

Director, information services, The Metropolitan Opera. Responsible for system design, programming and operations.

1980-1981

Assistant vice-president, Manufacturers Hanover Trust Corp. Was senior manager for five project leaders dealing with internal consulting and development of new technology for international funds transfer.

1976-1980

Assistant treasurer, Chemical Bank. Was senior manager overseeing four project managers.

1975-1976

Vice-president, John C. McWilliams and Associates. Consulted for a firm advising the hospital automation field.

1972-1975

Director of systems and data processing and associate director of finance, George Washington University Medical Center.

1967-1972

Director of systems and data processing, Mount Sinai Medical Center.

1965-1967

Program coordinator, Control Data Corp.

EDUCATION

B.S. in mathematics, George Washington University, 1972.

MICHAEL SIMMONS

EXPERIENCE

May 1990-present

Group executive and executive vice-president of technology and operations, Bank of Boston. Leads a restructured and centralized group of more than 2,000 employees charged with providing advanced technology and operational support to the entire corporation.

1988-1990

Executive vice-president of BankAmerica Systems Engineering. Responsible for designing and operating worldwide computer and telecommunications systems.

1984-1988

President, Fidelity Systems Co. Directed a work force of 1,100 responsible for data processing operations, software development and customer service.

1980-1984

Executive vice-president, information systems and operations, American Fletcher Bank.

1968-1980

Systems engineer, IBM. Installed equipment, wrote applications packages and provided technical help to customers.

1964-1968

Biology teacher, Arsenal Technical High School.

EDUCATION

B.S. in biology, Indiana State University, 1964.

Continued from page 17
side of things."

If running the systems operation of a major corporation is the career goal, what is the first step? It may be working for a vendor company.

"That first job was the most fortu-

itous," Simmons says, "because one of my accounts was American Fletcher Bank. When they needed someone to fix their DP problems in 1980, they offered me the opportunity."

Adam was a sales representative for IBM from 1973 to 1976 and had Litton as

one of his accounts. When that company needed a new director of computer systems, it didn't have to look far.

Working for a vendor can help a young engineer not only prove his technical talents but also help hone them.

"One characteristic of computer companies," says James Sutter, who worked for 16 years at Xerox Corp., "is that they put a lot of emphasis on training."

Currently vice-president and general manager at Rockwell International Corp., Sutter says that if he were starting out today, he would consider a different launching pad into IS — systems integration at a place such as Arthur Andersen. "There you are thrown into a wide range of installations, helping with training and implementation. That's where you can get a firehose dose of experience. Drink from the firehose wherever you can find it," he says.

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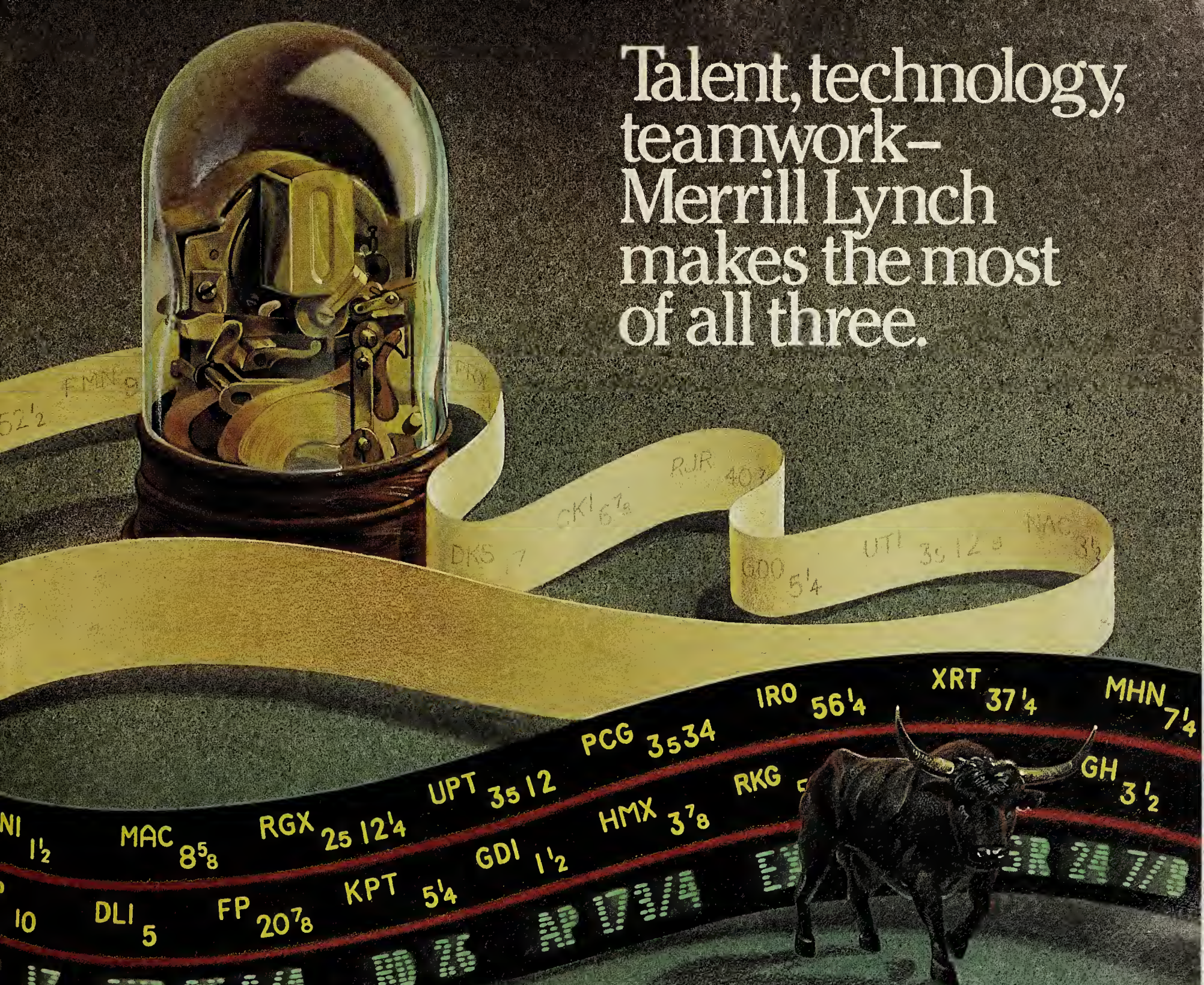


Sales Technologies

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Harrar, former features editor at *Computerworld*, is a free-lance writer based in Wayland, Mass.

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STEVE LEWIS

Harvard B-school professor F. Warren McFarlan says the best computer-related jobs can be found in financial services, wholesale and aerospace

The most far-reaching change in the world of information systems management during the next five or 10 years may be the blurring of the distinction between careers in IS and general business management. One individual with a particularly clear perspective on this issue and a host of others in IS is F. Warren McFarlan, the Ross Graham Walker professor at Harvard Business School. McFarlan, who specializes in strategic planning and IS, has taught the management of information technology for nearly 30 years. Former Computerworld senior writer David Ludlum spoke with him for the Campus edition.

Q Can you assess the state of IS education at colleges and universities around the country?

A It varies all over the place. We're training people for very different roles. We've got edu-

cation for those who are going to be the doers — database architects, programmers and analysts. And then we've got education for those who are going to manage the departments that are going to be impacted. In general, the more specialized the technology, the better job we do of training people. It's easier to train people to do technical jobs than it is to think through the administrative environment within which the tasks are going to be executed.

Q Is there an adequate job being done in technical training?

A The job is being done better in the technical areas than in the nontechnical. It has a lot to do with career paths. What does a typical MIS professor get trained in? He gets trained in research methodology. He gets trained in computer science. Does he get trained in all the

nuances of applications development and how to make things happen in the real world? No.

Every year, I go to the leading conference of information systems academics. They are different from the people I spend most of my life working with because they are heavily focused on the technology kind of education, and they try to help people think about things in a very hands-on, how-to-make-it-happen way. They aren't very good at business policy or the broad view on how an organization operates and how the technology can be grafted onto it.

Q What advice do you give students interested in going into IS management?

A My advice to those students is this: You don't want to work in a company where IS is not a big deal. Go to a place where the expenditure

levels as a percent of sales are large, where there is very significant value added.

You've got to go to a company where intelligent technology really matters and where there is some *perception* that it really matters so that you don't get caught in some technical backwater of the organization. When something really matters, it reports higher, general managers are more actively involved with it, the compensation levels are higher and there's an ability to talk about your unit's contribution. At American Airlines, it's a big, big deal. Senior management knows it. IS management knows it. It's a great training ground. Citibank — again, a first-rate environment. People understand right from the chairman on down that IS is changing the nature of banking, and attention is spent on it.

What industries do you recommend?

A In financial services it's a big deal in terms of new product development, new channels of distribution. In the wholesale industry, IS can provide a big competitive advantage. In aerospace, there are very complex [computer-aided design and engineering] efforts. Look for places where [technology] is aligned with three or four things that the company has to do right to be successful. That's where the large salaries are; that's where the challenging problems are; that's where you can make a really big impact.

Do you find many Harvard graduate students gravitating to careers in IS?

A My guess is that it's a relatively limited number of people. Most of our students

are going off into marketing or production jobs.

I'm not sure if it might be 5% of the class or 7% of the class that would go into IS management.

Part of the reason is that a number of the IS management positions are filled by people coming right out of the technology side. Two years here doesn't give that kind of apprenticeship.

Our students have a very strong general management orientation. Their interests as they graduate are geared to major positions in profit centers and corporate leadership. It's a much smaller group that aspires to major leadership roles in staff activities like information systems.

Does this mean going into information systems is inconsistent with reaching a position of significant responsibility for a profit center?

A If we look for where successful information systems managers will come from in the early 21st century, we will find them having significant positions in both end-user departments and the information systems function.

They can enter the organization in either way. The key thing is they have to spend time on each side.

Look at it candidly: Student coming out of Harvard Business School carry along with them a \$65,000 debt.

Heavily focused on their minds are career opportunities and jobs that will allow them to extinguish the debt at a satisfactory rate so they can sleep better at night.

It's not clear to me that the compensation levels in information system entry-level jobs are commensurate with those in marketing and certain service management activities.

How much should your students know about information technology, even if they go into general management?

A We've put a very significant shift into our school's curriculum. We think that information technology is one of the major trends of the 1990s, and our core MBA program, as well as every one of our executive education programs, has a significant course on information technology and business transformation.

We don't waste a lot of time teaching people the intricacies of relational data architecture or the technical performance of different kinds of local-area networks because that technology tends to be very specific to a point and time. But in terms of developing an understanding of how the technology is changing organizational structures, how it's allowing new kinds of control techniques to be created, how it's improving responsiveness in the company, how it's opening up new channels of distribution and how new forms of electronic technology enable strategic alliances — those are really big things [and are discussed in a] required course in the first-year MBA program.

For those who do go into IS management positions, what are the challenges they will face in the next five years?

A The first one is the continual forging and maintenance of the partnership between themselves and key end-user constituencies. A second set of issues is helping to identify and work with end users to think about potential ways in which new technologies can be applied. Thirdly, there's a very important focus on simply making sure their organiza-

tions are up to speed in terms of understanding what the new technologies are and how they may impact the company. The final one is the ability to facilitate the transfer of information technology understanding throughout the organization.

What do you think of the prospects for IS managers going on to top-level management?

A In companies where IS is a big deal, it will happen. I'm a director at the Royal Trust Co. in Canada. Our chief operating officer has come out of the information systems function. He's a super high-energy person. He has total command of the technology but knows the rest of the business.

Do you think that's going to become more common in 10 years?

A Yes, because of the kinds of people who are going [into IS] and the diversity of the career path. If you want to be a general manager and you enter the information systems side, you may start as an analyst at a bank, move on as a branch manager and come back as manager of a large systems and programming group. You look for significant management jobs on each side as you move on up in the organization.

I emphasize the word "line jobs" — people who help in dealing with real customers, real problems, feeling real pressure. The people who enter the information systems function who can head large project teams and then gain insight into what it really takes to be successful are the ones who have the careers. ◀

Ludlum is a former Computer-world senior writer.

Want that BMW? Specialize!

Niche knowledge is nice, so know your acronyms

By Michael Cohn

When I first started out, just saying you were in information systems was saying a lot. It got you a car loan. Realtors sat up and took notice. Eligible women stalked mall book stores, throwing themselves on unsuspecting souls in the computer section, even when it

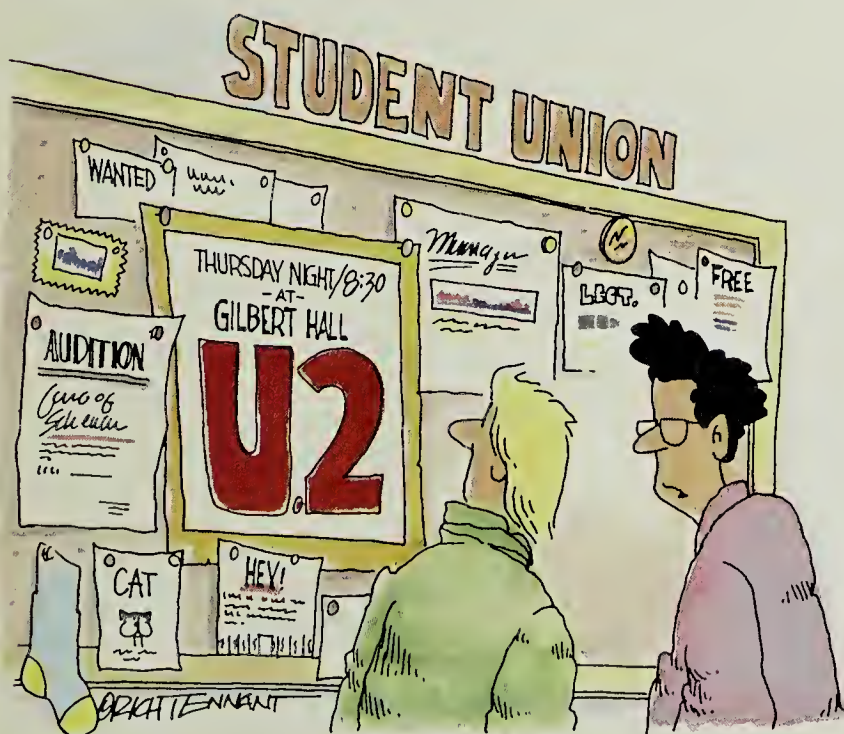
was just a 12-year-old buying Hanukkah gifts for his uncle in Toledo. Believe me, those were the days.

Today, IS has lost its glamour. Everyone knows how to use a computer. Most folks mastered Pac-Man years ago. And Cobol programmers are a dime a dozen, although they still want 60 bucks an hour and a window office.

So let me offer some advice to students at the fine universities and institutes around the globe: You can't just go into IS anymore. You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

If you want to get a great offer, make the big bucks and lease the German-made convertible of your choice, find your niche in the computer field. Before it's too late, consider one of the following:

- **The X fields.** Anything that ends in X is big right now, like Unix or AIX or KIX or TRIX. Just say it with a straight face, and you'll be heading for six digits.
- **Multimedia.** Multimedia is the wave of the future. Companies are racing to integrate video, audio, text and touch screens, all under the control of a single end user. Not only will this change the way we work and use information, but no one will ever have to miss another episode of General Hospital again.
- **ISDN.** ISDN is hot, and everyone is looking for someone who knows what it stands for. Even hotter is TCP/IP. Companies are impressed by any acronym that contains a slash, and you'll definitely get called back for a second interview. But if you really want the whole enchilada, bone up on X.12 or X3S3.3 or anything else that has a period in it somewhere. They're on the top of every employer's list, until someone invents an acronym with a semicolon or two.



"IT TURNED OUT TO BE A TWO HOUR LECTURE ON A NEW COMMUNICATIONS PROTOCOL."

NOTES

AN APPLE FOR THE STUDENT.

► When freshmen arrived at the Des Moines, Iowa, campus of Drake University this fall, they found Apple Computer, Inc. Macintoshes installed in their rooms.

The campus is in the process of installing a digital information network to serve as an information exchange between students, faculty and administrators.

The computers are university owned, but the students pay Drake for their use.

• **NI.** Artificial intelligence is out, natural intelligence is in. Nobody wants that artificial stuff anymore, unless it's less filling or tastes great.

• **Assembler.** No matter what anyone says, there is still a need for assembler programmers — primarily so they can teach assembler.

• **JEDI.** EDI is already passe. Everyone in the Fortune 1,000 who wants electronic data interchange has got it by now, and data interchange specialists are being laid off by the truckload. The new field is JEDI, or Junk EDI, which involves figuring out ways to electronically transmit coupons for aluminum siding or pictures of Ed McMahon.

• **Computer security.** Computer security is the brightest field in IS. Companies spare no expense protecting themselves from hackers and unauthorized access. The sky's the limit for specialists who can learn and control every detail of corporate assets, security algorithms and vital financial data. Best of all, these positions tend to have remarkable job security, for some strange reason.

• **Computer engineering.** There's a tremendous shortage of computer engineers. People still think computer repair means being glued to a beeper and working all hours of the night. Companies are aggressively trying to shed this outdated image and are paying top dollar for good technical people. In fact, hardware maintenance is the top priority of technical recruiters

You can't just go into IS anymore.

You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

today — that and finding technicians who know how to fix beepers.

• **The Big Eight.** The Big Eight is always looking for entry-level IS consultants. Sure, the hours are brutal, the travel is hell, and you work like a dog just to move up the ladder. But with a little patience, you'll soon be working for the Big Six and then the Big Four, and at least it will seem like you're getting someplace.

• **Contract programmers.** Despite the gluts and layoffs in other industries, contract programming continues to flourish. IS managers are always trying to find contract programmers — especially after 4:30 p.m. when their cars disappear from the parking lot. ◀

Cohn is trying to be a computer salesman in Atlanta.

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The dormpreneurs

High-tech hotshots who launched lucrative careers from campus

By Alan J. Ryan

Three years ago, Justin Boyan entered the University of Chicago as a freshman. He was also chairman of his own company. Today, barely in his 20s and a senior mathematics major at the university, this "dormpreneur" is working on Version 5.0 of his own homegrown communications software package. He says he has earned enough from his business to pay for his education.

What it takes to be an entrepreneur, Boyan says, is a lot of stamina, the ability to withstand rejection, persistence and a good product. Other successful computer industry figures who opted to start their own businesses during or instead of college agree.

At age 34, West German native Andy Bechtolsheim's resume is simple: He arrived in the U.S. as a student in 1975, earned a master's degree at Carnegie Mellon University, began a Ph.D. program at Stanford University, constantly toyed around with computers, dropped out of Stanford and helped found Sun

Microsystems, Inc.

Did Bechtolsheim make the correct choice in forsaking his Ph.D.? If Sun's success is any indication, the answer is a resounding yes. Sun's 1989 revenue was \$1.7 billion with earnings of \$60.8 million.

Boyan's business, Boyan Communications, had a more modest beginning: He started it in October 1986 from his home in Columbia, Md., while still in high school.

"I had a modem, but I was too poor to buy any communications packages," Boyan says. He began using shareware programs that were available through bulletin boards, but even these did not satisfy his needs. "So I started writing my own software, and the program



MICHAEL DELL found early sacrifices had later payback

WILL VAN OVERBEEK



DAVID JOEL

JUSTIN BOYAN had stamina, an ability to withstand rejection and a good product

kept growing," he says. Boyan began marketing his Boyan Communications software for IBM Personal Computers and compatibles as shareware when he was a senior in high school.

To date, Boyan has sold 2,000 registered copies of the package, known as Boyan. The software sells for \$40 and was on *PC Magazine's* "Best of 1987" list.

SCHOOL'S OUT

Not all dormpreneurs start their ventures while they are in college or high school, however. Some drop out to get going,

while others begin immediately after graduation.

"A good time to start a business is right after you finish school, because you're used to living like a student," says Dan Bricklin, a software entrepreneur who has founded three separate companies.

Bricklin created the successful commercial software spreadsheet program, Visicalc, while he was in his late 20s and was still a student at Harvard Business School.

An enterprising individual who decides to work for someone else before starting a

business may have a tough time starting a business later on, Bricklin says, because most people find the spartan student lifestyle tough to go back to once they've left it.

Michael Dell, who founded Dell Computer Corp. at age 19, agrees. He says that when he dropped out of the University of Texas after his freshman year to start his own business, he was able to get by on a salary of \$20,000 per year.

However, early sacrifices can have future paybacks. Today, 25-year-old Dell is chairman and chief executive officer of a company that pulls in nearly \$500 million annually. His personal wealth is estimated to be approximately \$60 million.

Dell says he did not wait to finish school before making his mark on the world because he saw an immediate need in the market for a business in which PC users could buy add-ons and upgrades without having

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"A good time to start a business is right after you finish school, because you're used to living like a student."

Dan Bricklin

Software entrepreneur

to pay high mark-up prices. His solution: mail order.

Today, Dell's company sells complete PCs through the mail.

Bricklin, who is currently vice-president at software vendor Slate Corp. in Cambridge, Mass., says that while a young entrepreneur may not have much experience in dealing with the business side of starting a company, "life is a good teacher."

Boyan agrees. "There are a lot of business aspects to this I've had to learn about — sometimes the hard way," he says. For instance, he adds, "I know a lot about copyrights and postal regulations now."

Still, Dell says, things have a way of coming together if you're cut out for the role of entrepreneur. "If you have to read how to succeed, if you have to ask somebody, if you have to go to lots of classes or seminars," then you might not have what it takes to start your own business, he

says. "It's a gut feeling — at least that's what it was for me."

However, even those who do possess the entrepreneurial spirit learn that starting a business is not easy. Sometimes, Dell says, getting a business off the ground when you are young is more difficult because people do not always take you seriously.

When Boyan started out, he says he wrote letters to authors of other communications programs to share his ideas on what kinds of things such programs should include. "I didn't get any feedback," he says, "so I just jumped into it myself."

Dell adds: "You have more energy and ability when you're young. The hours I worked when I was starting out — lots of people said if I were in my 40s, I would not have had the same level of energy. But I haven't gotten there yet to find out if that's true."

Boyan admits he's been through some rough times, especially in trying to balance business and school. "I always feel as though I'm not devoting enough time to one or the other." Filling the orders is manageable, he explains, but finding time

Breaking in is hard to do . . .

The entrepreneurs we talked to said that lots of great ideas for the computing industry came to them while they were sitting in classes, but it was not always the classes that inspired them — the most important inspiration comes from inside. You have to know whether you have an entrepreneurial nature. Are you a leader, or do you feel more comfortable taking direction from others?

If you are a leader, read on for some do's and don'ts from successful entrepreneurs:

- **DO** go with your gut instincts.
- **DON'T** hesitate when opportunity knocks. If you have an idea worth exploring, don't wait until you finish college or graduate from school, because someone else may have the same idea.
- **DO** take classes to learn how to run a business.
- **DON'T** try to push an incomplete or substandard product into the market just to be first.
- **DO** solicit advice and feedback from people you respect and trust.
- **DON'T** count on getting rich overnight.
- **DO** get used to rejection from others. Fellow students, companies, loan officers, venture capitalists and even potential employees may scoff at your ideas.
- **DON'T** rest on your laurels once you start to succeed. Keep pushing for more fresh ideas so your company can grow and mature.

ALAN J. RYAN

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to continually update the code to meet ever-changing telecommunications requirements, such as high-speed modems and new protocols, is challenging. Boyan's time may be even more in demand in the future; he plans on pursuing a graduate degree in computer science.

Young people, however, typically have fewer commitments and may bounce back more easily if their businesses do not pan out, Dell says. "You have less to lose and probably don't have a family relying on you for support," he says.

One business started by students that did pan out — and which has been profitable every quarter but one since its inception in 1982 — is Unix workstation vendor Sun.

Bechtolsheim, Sun's vice-president of technology, helped to found the firm with Scott McNealy, currently president and CEO, while Bechtolsheim was a Ph.D. candidate at Stanford. At the time, Bechtolsheim had job offers from other companies, but none seemed to understand the workstation market, he explains, "so I figured I was better off doing it myself."

Today, Sun is looking to other entre-

Young people typically have fewer commitments and may bounce back more easily if their businesses do not pan out.

Michael Dell
Dell Computer

preneurial minds, including those of students, Bechtolsheim says. "We are setting up a new laboratory where we want to work with people who have good ideas about good future products," he says. In charge of the laboratory is Bill Joy, vice-president of research and development, who joined Sun just days after the company's inception. Joy came from the University of California at Berkeley.

Bechtolsheim says that in the competitive environment of the 1990s, it might be nearly impossible for anyone to start an-

other hardware company such as Sun. "We have 2,000 engineers at Sun, which is an incredible investment," he says.

However, there are markets, such as software, that entrepreneurs can get into with little or no venture capital. "The whole infrastructure cost of buying the tools and the platform can often be done by putting a second mortgage on your house," he says. A good programmer could probably write an interesting software package in a year, he adds.

Students who are looking for large markets and big dollars at the start may be overlooking lots of opportunities, Bechtolsheim says. For instance, Sun will likely ship 150,000 to 200,000 of its Unix-based workstations this year; a student who can sell a package to just 5% of Sun's installed base would be doing quite well.

"The people who really do well are those who feel there is a problem to be solved and who really push the thing forward," as opposed to those who are looking to get rich quick, Bechtolsheim says. ◀

Ryan is a *Computerworld* senior writer.

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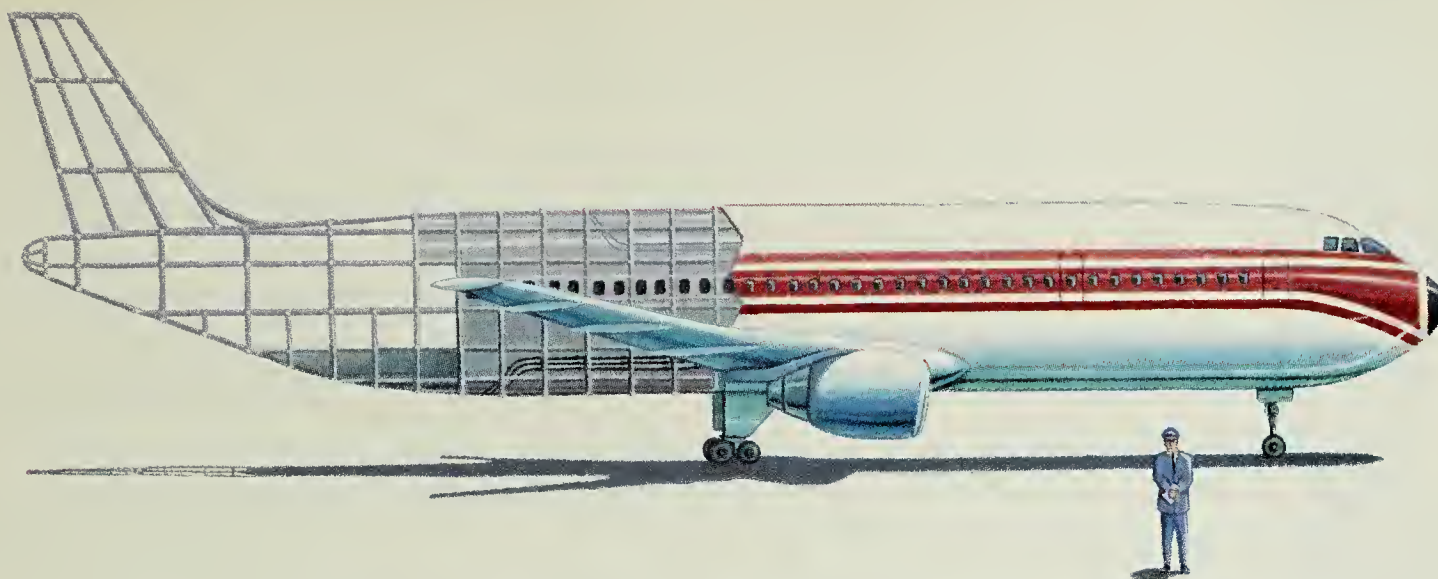
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GLENN REID

From circuit boards to the IS circuit

"In engineering school," Ricardo Fishman says, "they don't tell you that you need a broader view of the world." Significant words from the 24-year-old Fishman, who holds a degree in electrical engineering (EE) from Boston University. Fishman's sentiments point to a subtle and steady trend: A small percentage of EE graduates are being drawn to information systems careers because they want to be more involved in the business side of the technology. They say they want to move into positions where they can use their technical knowledge to influence corporate direction.

For Fishman and other EE students, the path into IS is neither simple nor well beaten, but it has all the earmarks of becoming one of tomorrow's most popular tracks.

For his part, Fishman, who lives in Allston, Mass., complemented his regular EE course load with offerings outside of the department — courses such as technology strategy, engineering economy and international finance and accounting.

A native of Venezuela, Fishman says he wanted a better understanding of how business is conducted in the U.S. He says he found the EE program to be too focused

on the technology and on chip- and board-level learning. Seeing technology's broad view and strategic side were key for him, as was learning about technology's implications for engineering. In this sense, Fishman says, he didn't think EE was going to be fulfilling for him.

"In the real world, there's a tremendous gap between the engineering community and the business community. The business community is definitely dominant because it has the power that comes with bottom-line financial control," Fishman explains.

James Bruce, a professor of electrical engineering at MIT, acknowledges that there is still a lack of coupling between formal degree programs and what IS requires.

"We're always going to have a lot of discontinuity between someone's educational background and IS," he says. Bruce, who is also vice-president of IS at MIT, says he hires electrical engineers from MIT and elsewhere to work in the school's IS department but adds that there are still a lot of people coming into the IS profession from a wide variety of disciplines.

"What we're really interested in are their accomplishments in information technology areas rather than a specific

Interested in influencing corporate direction, electrical engineering majors are crossing over to IS positions

By Kathleen Gow

STUDENT PROFILES



Sean Joseph Walsh
Age: 24

► Bachelor's, business administration and finance, Texas Tech University, Lubbock. MBA in Information systems, Texas Tech.
► "I'm currently working for Pepsi Cola, Inc. in Albuquerque, N.M., as a distribution management trainee. In 10 years, I would like to be the VP of operations of some area in Pepsi."



Patricia Ramatowski
Age: 38

► MIS major, Southern Illinois University, Edwardsville. Master's, Information management, Washington University, St. Louis.
► "I work for a Department of Defense agency as a programmer/analyst. I would like to advance into an information management position."

degree path," Bruce says.

Electives and part-time jobs are an important consideration. A student with a part-time job maintaining Unix systems, for instance, would be well prepared to enter the software community, Bruce says. "The bottom line is, there's no such thing as a standard EE degree," he says.

While MIT's IS department hires electrical engineers straight out of school, it is rarely an easy transition. Dave Berlien, college relations supervisor for business and computer systems staffing at Du Pont Co. in Wilmington, Del., says his company doesn't hire electrical engineers for systems jobs. Instead, Du Pont is looking for computer science and IS majors.

Berlien says he has been happy with systems engineers from the University of Virginia, computer engineers from Ohio State University and computer technology graduates from Purdue University and the University of South Florida: "We like those candidates because they are very applications-oriented and have a lot of project experience. It's a good fit."

He admits, though, that because the IS area is a new one and has been exploding in size during the last few years, Du Pont ends up taking people from many different fields.

Berlien notes that hundreds of EEs work in Du Pont's systems departments, but most of them have been in the work force for a while. "It's on-the-job training. These employees bring with them strong technical backgrounds. A lot of them have been involved in manufacturing, worked out in plants and understand that side of the business," he says.

Michael Ferone, personnel representative at NCNB Corp., says his organization has hired EEs in the past for IS jobs, but it doesn't seek them out: "We don't want strictly technical people. We want people with more of a business background who can communicate with users."

NCNB would consider electrical engineers along with computer science grads for systems jobs, Ferone says, but the bank looks carefully for strengths such as leadership, communication skills and involvement in extracurricular activities.

The need for strong communication skills as a requirement for entering IS, especially management, was echoed by Robert Gallagher, director of information technology services at Rensselaer Polytechnic Institute (RPI) in Troy, N.Y. The information business is so dynamic, Gallagher explains, that people working in the field have to be receptive to learning new things. "If they resist change, they will become obsolete, and opportunities will be limited," he says.

Bruce adds that a large number of RPI students get MBAs after earning a bachelor's degree in a technical field and are well suited to understand technical and business issues. The job seekers that successfully move from electrical engineering into IS often acquire a more business-oriented degree to help make the switch.

"If a company sees an EE who's gotten an MBA,

that shows where the person is headed," says Jim Scimone, managing director at the Wellesley, Mass., branch of Source EDP.

While Scimone says he does not see a major movement of electrical engineers toward IS careers, he does see a growing trend of traditional service companies looking for software engineers to develop communications software.

Steve Nichols, a student at Texas Tech University, says combining a business degree with a technical undergraduate degree is the wave of the future. "A lot of engineers are doing it because they realize it's important to see both sides of the business," he explains. Nichols started an MBA/MIS degree program after finishing his undergraduate degree in EE technology.

After he completes his degree, he will work for Sandia National Laboratories as a programmer and analyst. Nichols says he is sure he would not have been considered for the position at Sandia based solely on his EE degree.

"We don't want strictly technical people. We want people with more of a business background."

Michael Ferone
NCNB Corp.

The mix of engineering and MBA programs was a boon for Nichols. The engineering program forced him to do group work, while the MBA program forced him to give frequent group presentations, which has been important for building his communication skills. Furthermore, the exposure he has gained from marketing, management and finance courses has given him a better understanding of business and other people's needs.

Boston University graduate Fishman, however, says that his technical degree, coupled with his jobs at two technology consulting firms, gave him an edge over his more business-oriented co-workers for consulting and selling. "For instance, if we were working for a manufacturing firm that was trying to integrate systems in different places, I could ask the right questions. My colleagues often didn't understand the technology, so it took them longer to come up to speed," he explains. "An electrical engineering degree made my life easier — better than an MBA."

As for the problem of building a background that meets the industry's needs and selling it to employers, Fishman is realistic: "People expect EEs to develop hardware or do software maintenance support. If you want to get into something else, it's a matter of marketing yourself and having the right attitude." ◀

Gow is a free-lance writer based in Medford, Mass.

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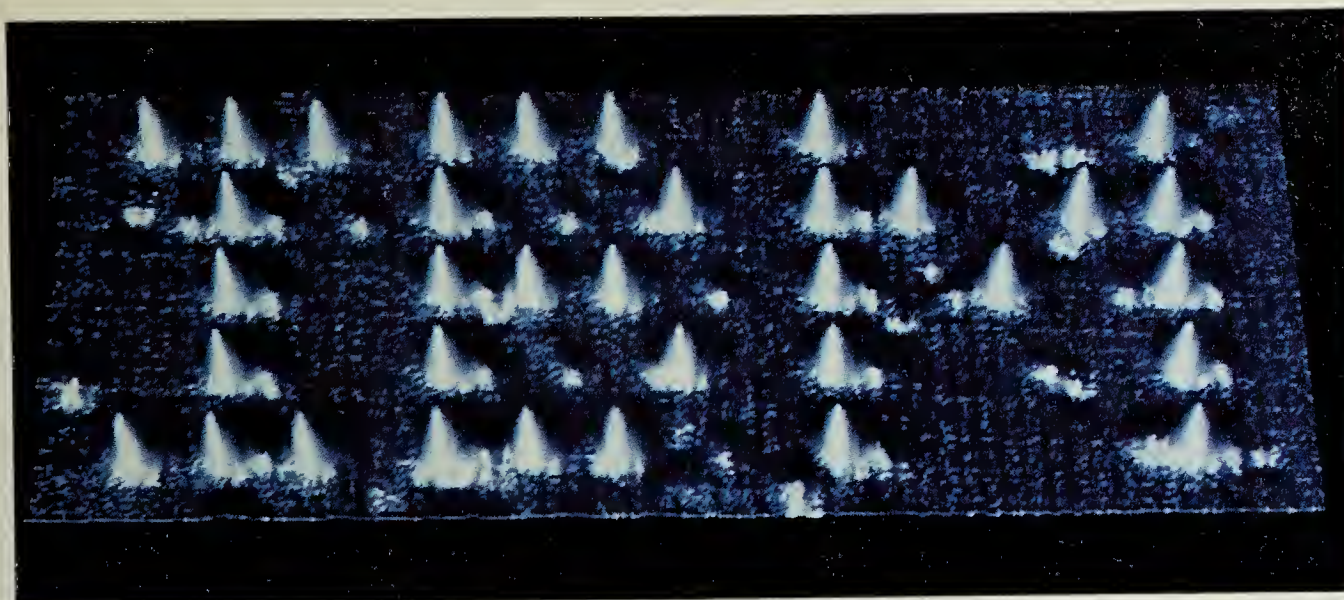
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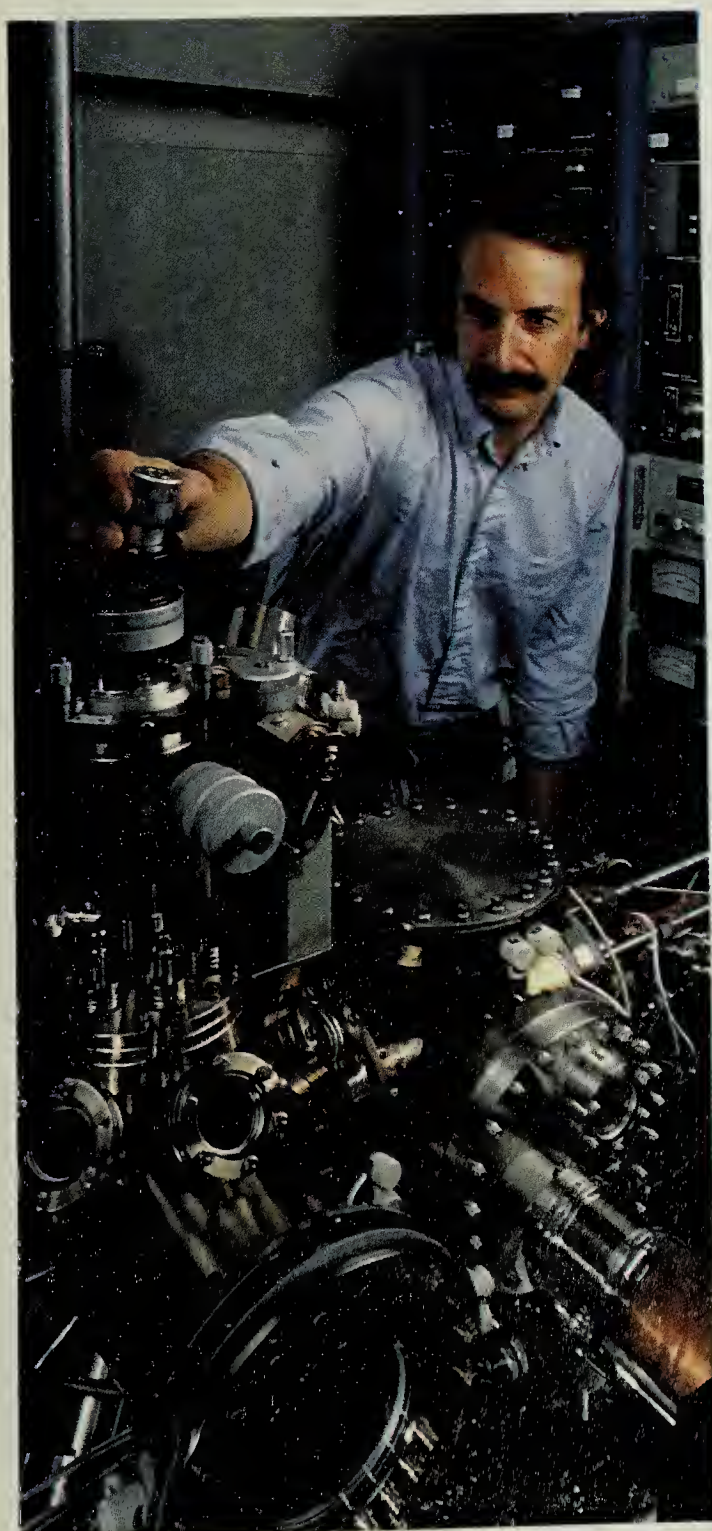
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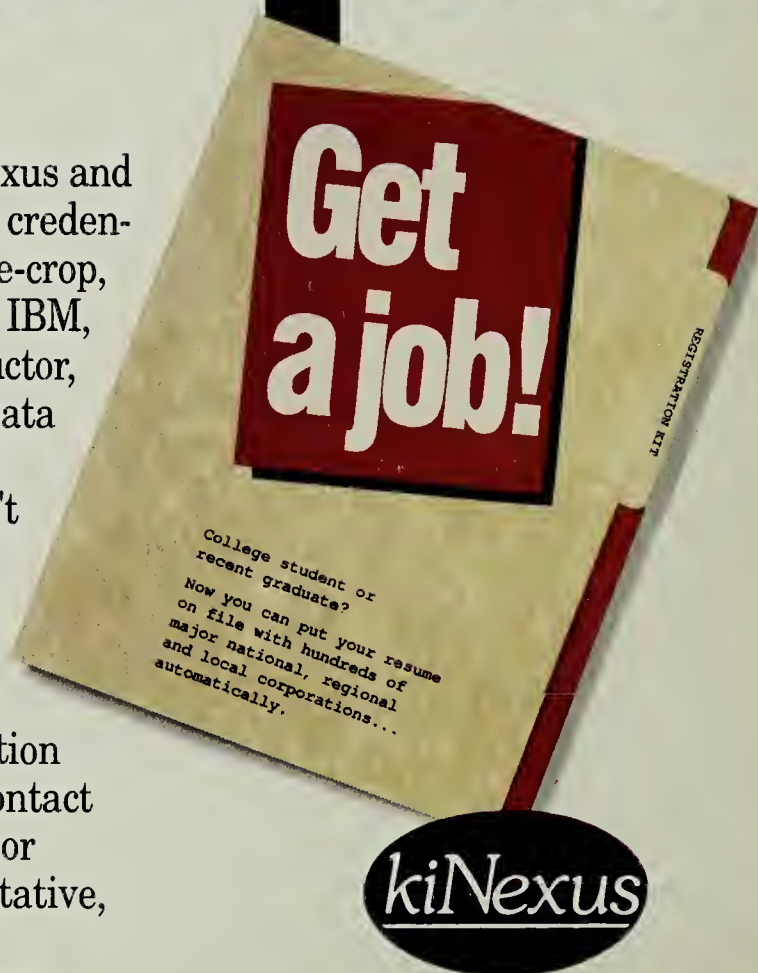
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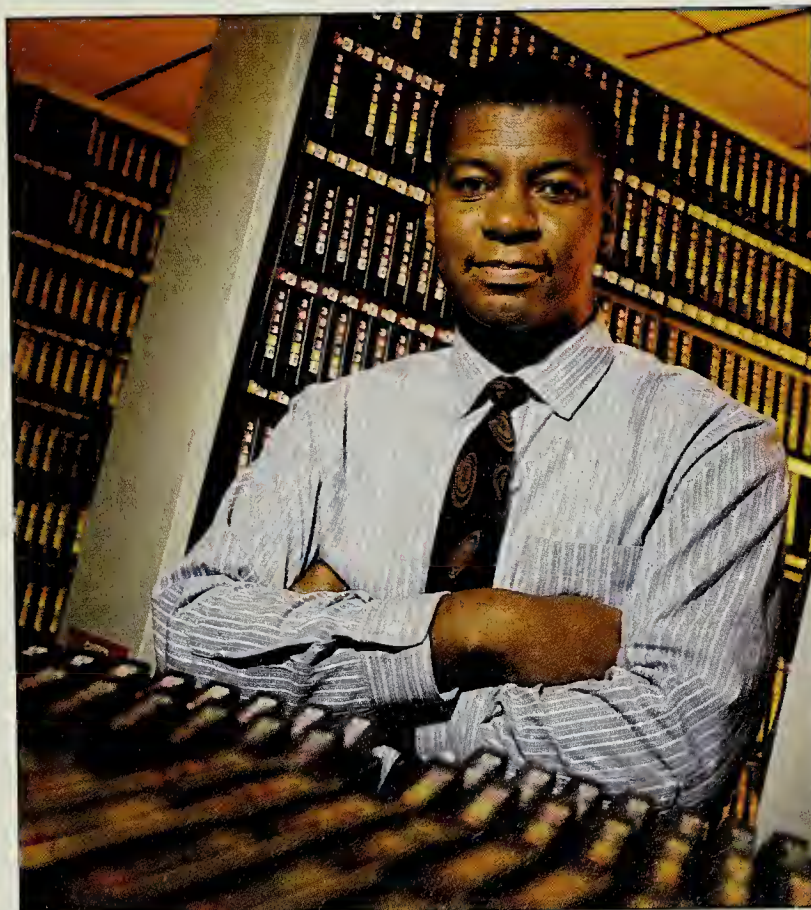
By Amiel Kornel

At first glance, Robert Henderson's future seems assured. Hard-working and dedicated, he has advanced his career in information systems at a fast clip. In the dozen or so years since landing his first job as a night computer operator for an insurance company, he has risen to become IS project manager at a food distributor, managing teams of up to 18 programmers and analysts.

Henderson worries, however, that further career opportunities may be limited. As a 29-year-old black man, he fears being shut out of the senior management ranks of a profession that is overwhelmingly white.

"I'm at a point now," Henderson says, "where it's going to be very hard for me to move up any further." Line management, he suspects, marks the end of the line for a black man carving out a career in IS. "We are not the ones typically in the VP of IS positions," he notes.

His concerns are well founded. Computer professionals, academics and recruiters say minority men and women rarely attain the highest ranks of information systems management. Although they are



KATHERINE LAMBERT

ROBERT HENDERSON worries that his career path may be limited by color barriers

one of the symbols of modern progress, computer careers appear to be anything but color-blind.

"The field is attracting blacks, but not in the numbers it should be," acknowledges Vivian Wilson, president of Black Data Processing Associates (BDPA). "Information processing requires a strong background in statistical, mathematical and science disciplines, and minorities are generally not strong in these areas in school." As a result, young minority students often hesitate to embark on a career path that might simply lead to a dead end. This compounds the problem by keeping the pool of minority IS job candidates low.

"Your chance of experiencing great rewards is probably not as good as in other professions," says Bob Mathews, a black systems manager who is Henderson's boss at Richfood Holdings, Inc.

NOTES

REGISTER BY PHONE

► Students at the University of Pennsylvania will be going to PARIS this year to avoid registration lines. PARIS, the Penn Automated Registration Information System, allows students to register for their classes from their dorm rooms with a touch-tone telephone.

Students can dial into a computer, and a mechanized voice walks them through the process. By using the phone as a keypad, the callers can be registered for their classes within five minutes.

"It's very hard to break into the bastion of white male dominance," says Beverly Lieberman, an executive recruiter at Halbrecht Associates.

The pattern of exclusion is not reserved for blacks. Asked what affect being Hispanic has had on his career, Nicaragua-born Julio Guillen, IS manager at Bio-Rad Laboratories in Hercules, Calif., says, "There are probably certain situations when promotions have gone elsewhere."

According to Equal Employment Opportunity Commission figures, progress for minorities has been at a virtual standstill at the high end of the computer career ladder. In 1988, 92% of IS managers were white and 8% were minorities — the same percentage split found in 1980 and 1985 (see chart page 41).

WOMEN ARE SCARCE

The problem is particularly dire for minority women. When Halbrecht Associates was asked to recruit a minority woman as IS director for a big organization in New York, its nationwide search turned up only six potential candidates, Lieberman says.

"Compared to other business functions, there are a fewer number of minorities interested in information technologies," says James Senn, director of The Information Technology Management Center at Georgia State University in Atlanta.

For those minorities who do enter the field, climb-

Although they are one of the symbols of modern progress, computer careers appear to be anything but color-blind.

ing the corporate ladder requires working extra hard to overcome doubts that some colleagues may have about their abilities. "I make sure that I perform at at least 120%," Henderson says. "I make sure that I break every kind of stereotype that anyone may have."

According to Chet Holmes, an account manager at Candle Corp. in Los Angeles who started his career in IS, many blacks are interested in the profession, but few move up quickly. "What keeps many blacks from moving forward is not being able to identify a mentor within the department," Holmes says.

Wilson agrees and points out that her organization, with a national membership of 1,400, is actively working to encourage its members to become mentors to high school and college students. BDPA sponsors a national competition in computers and information processing for high school students and gives scholarships to winners. This year's competition involved more

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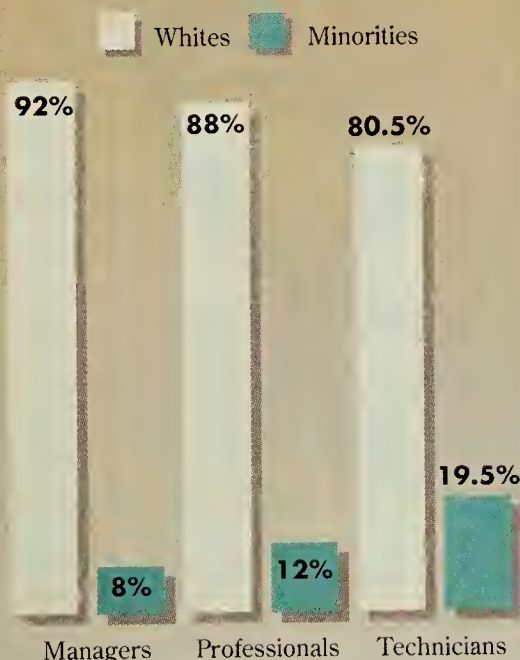
than 1,500 students in 18 cities. "The idea is to expose students to what it is like to work in this field and encourage them to go on to college with this in mind," Wilson says. "In this way we act as role models."

Minority IS professionals report that their achievements and failures are often magnified in the eyes of white management. "They expect you to be more on the ball," says Debbie Gore, a black information security administrator at Federal Mogul Corp. "You have to prove yourself."

This intensive scrutiny, however, can be a benefit, she says: "If you end up getting a reputation for being very good, things move your way."

In the minority

The number of minorities in the computer field is low, with the fewest in upper management posts



Source: Equal Employment Opportunity Commission

"I consider my Asian background as an asset," says Duc Won, Korean-born president of Applied Systems Institute in Maryland. He says he has gained an aura of competence because Asians are viewed as gifted in technology-related areas.

Although some Asians say being characterized as technologists can become a liability when later seeking a management position, Ann Li, corporate vice-president at Paine Webber, Inc., says the problem is faced by "anyone who is a techie."

Nonetheless, the question remains: Why have so few minorities broken into senior management positions in one of the fastest growing professions?

Part of the answer, no doubt, lies in the intolerance bred by age-old prejudices. Blacks, Hispanics and Asians interviewed for this story, however, insist that they've

rarely experienced open hostility and prefer using euphemisms such as "color sensitivity" and "traditional attitudes" when talking about what in an earlier era would have been simply labeled racism.

"You can't blame anyone for a mind-set that has been around for a couple of hundred years," Henderson says.

Minority professionals assert that their career advancement depends on their skills at least as much as on their race. Minority IS professionals also cite some of their own cultural traits and traditions as potential obstacles in their efforts to climb to executive IS positions. They say these must be modified before climbing the IS career ladder becomes possible.

Jauruey Chew, a network switching director at US West who was born in China, notes that Asian culture emphasizes unquestioning obedience and silence, traits that are an anathema to U.S. management technique. "The American corporate environment is interested in having people take the initiative," she says. Chew, who oversees the work of a staff of nearly 400, has clearly learned to adapt.

For young blacks and Hispanics, a lack of role models in science- and engineering-related fields can pose a problem. While accounting for 10% of the total work force, blacks held only 2.2% of the nation's science and engineering jobs in 1986, according to a recently released report by the National Science Foundation.

"Normally, in a black household," Henderson says, "it's very rare to find a college-educated black man who had anything related to a scientific training." He says he hopes his experience and that of

Minority IS professionals report that their achievements, like their failures, are often magnified in the eyes of white management.

other minorities will change that. "We're starting the tradition now," he says.

Educators are also paying closer attention to providing minority students with the math and science training they need to prepare for a career in technology. In the Washington, D.C., area, big businesses are funding an all-minority program in which 600 to 700 students are receiving help in developing their math and science skills, according to Lynford Lautz, executive director at the Fairfax County Public Schools Education Foundation.

Such measures leave room for hope, IS professionals say. As attitudes change and training begins to bear fruit, minorities may finally appear in greater numbers at all levels of IS. "Sooner or later," Gore says, "the walls have to come down."

More information can be obtained from the BDPA by calling (800) 727-BDPA.

Kornel is a former *Computerworld* features senior editor and is enrolled at MIT's Sloan School of Management.



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BIG INNOVATION ON CAMPUS

By Alan Radding

Colleges are at the forefront of technological advances

Your music course, chemistry class and language lab are showcases of multimedia computer pyrotechnics. The campus electronic mail system is so advanced, it makes even seasoned corporate network managers envious. And that tweedy, head-in-the-clouds philosophy professor of yours is hard at work programming interactive hypermedia courseware.

Surprised? Some of the most advanced and exciting computer technology developments are currently taking place on college campuses. "Universities and colleges have always led the way in innovation," notes Bill Graves, a mathematics professor at the University of North Carolina in Chapel Hill and director at the Institute for Academic Technology, an IBM-funded organization that provides fellowships to professors working on innovative academic computing projects.

Much of what students experience today by way of computer innovation on campus, Graves says, will become commonplace in the corporate world tomorrow. Computer science, information systems and electrical engineering students already accustomed to interactive multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

The breadth of computer innovation on campus is startling. A conference on academic computing earlier this year highlighted over 100 college campus comput-

er projects, covering everything from economics to geophysics to clinical psychology to music.

This innovative activity has been spurred in part by the large amount of money being poured into college computing. IBM alone spent almost \$600 million during the last five years, says L. G. "Buzz" Waterhouse, IBM's vice-president of academic IS in Milford, Conn. During that period, colleges launched over 3,000 IBM-supported programs. Other major computer vendors such as Digital Equipment Corp. have also aggressively supported college computing efforts.

Vendors are attracted to academic computing for more reasons than just the potential profit of selling computers to colleges, although Waterhouse concedes that colleges are "an important market for our products." IBM also sees the academic community as a leading source for patentable research, the front line in the development of industry standards and a strong influence on the direction of government and corporate

computing. Colleges were quick to recognize the potential of the computer — particularly the personal computer — and as a result, “personal computing is very widespread,” notes Kenneth King, president of Educom, a Washington D.C.-based organization involved in computing and communications in higher education.

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery, according to King.

So far, networking has attracted the big

money and the greatest interest from the corporate world. “Some universities are going into their third generation of networks,” King reports.

At these schools, campuswide Ethernet networks are already obsolete, superseded by 100M bit/sec. fiber-optic local-area networks. Campuswide networking itself is a fact of life at the top 200 or so universities, he estimates, and worldwide inter-networking between campuses is already well established.

Project Athena, a massive multivendor networking effort at MIT in Cambridge,

Mass., is one of the largest and best known college computing efforts.

The goal of Athena since it began in 1983 has been to create a single campuswide network using equipment from different vendors, according to Janet Daly, a Project Athena information officer. Students and faculty would need to learn only one operating system and could access any application or system anywhere on the network.

Before Athena, the campus was divided into many different computer systems, each from a different vendor, and users couldn't move easily — if at all — from system to system.

IBM and DEC committed a total of \$50 million in equipment and maintenance to the effort, along with five staff members each. MIT pledged to raise another \$20 million. Although originally intended as a five-year experiment, the partners agreed

Students already accustomed to interactive, multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

to extend the project three more years because courseware took longer to develop than expected.

POPULAR ITEM

Today, Athena has 9,400 users who access the system at least twice each week. As of March 1990, more than 92% of MIT's undergraduate and 55% of its graduate students were using it. Athena currently handles about 1,000 Unix workstations on a network designed to accommodate up to 10,000 machines.

What is extraordinary about the project is the number of technologies that have passed through Athena on their way to widespread computing acceptance. For example, Athena is recognized as having pioneered heterogeneous (multivendor)

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distributed computing. It helped establish Unix as the leading open operating system. The X Window System, a graphical user interface, as well as Kerberos and Hesiod network services (for security and file naming, respectively), are also Athena offspring.

Other Athena-like projects have cropped up on campuses across the country. At Carnegie Mellon University in Pittsburgh, the system is called Andrew, another IBM-supported effort. Andrew began as a mainframe time-sharing system but eventually evolved into a "marriage of time-sharing and PCs," an Andrew staffer says.

Today, Andrew appears to its 9,000 users as a giant, seamless Unix file system that even reaches out to other schools. In effect, it is a nationwide file server.

FROM COLLEGE TO THE REAL WORLD

Andrew has had an impact on the corporate environment. For example, the Open Software Foundation in Cambridge, Mass., selected the Andrew file system as part of its distributed computing specifications. The Andrew file system itself is being marketed as a commercial product. Andrew is the base of the University of Michigan's Institutional File System (IFS), an effort to create a massive, heterogeneous network built around an IBM mainframe as a central file server.

The scale of the project is staggering: IFS currently handles 15,000 desktop computers (8,000 Apple

Computer, Inc. Macintoshes, 2,000 Unix workstations and the rest DOS and OS/2 PCs), but IFS designers expect to accommodate as many as 30,000 desktop devices by the mid-1990s, says Ted Hanss, IFS project manager.

Communication is carried over a fiber-optic network backbone linking 75 buildings around Ann Arbor, Mich. The system is expected to be up and running this fall for the 6,000 students and faculty members who will be its first users.

Projects such as Athena, Andrew and IFS, despite their scale and complexity, are actually low-level tools that facilitate communications and make computer use easier. Much more campus innovation is taking place at the application level, where instructors are developing their own computer courseware. These applications make increasing use of the interactive multimedia capabilities of the latest PCs.

"Students learn through multimedia," Graves says. With desktop computers powerful enough to accommodate digitized sound and full-motion video in a Windows environment, he explains, professors have the tools to create very effective courseware. The result can be a learning experience unlike anything that can be done through conventional classroom and lab techniques.

For example, an interactive chemistry videodisc is available that creates dramatic simulations of what



SHORT FUSES.

► Computers in dorm rooms are becoming as common as refrigerators and televisions, according to a recent survey of 200 Davidson College students in North Carolina. *The New York Times* reported that 92% of the respondents had a computer in their rooms.

Of the top nine favorite dorm-room appliances, computers ranked sixth behind clocks, lamps, stereos, hair dryers and refrigerators. Curling irons, irons and hot pots followed.

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happens when certain chemicals are mixed — events that no person wants to encounter in a real-life laboratory.

Other such innovations include:

• **Parlez vous computer?** Jim Noblett, a professor of linguistics at Cornell University who is currently on a fellowship at the Institute for Academic Technology, uses the computer for language instruction, making the audio language lab seem primitive. To teach French, Noblett combined a bilingual dictionary with a word processor, creating Systeme D. "It is a learning tool that allows students to use language for creativity much earlier," he says.

Noblett added a tracking facility that shows the instructor the queries that students make to the bilingual database. "It gives us insight into what students think and how they learn languages," he says.

Most recently, he moved the software to the Microsoft Corp. Windows environment on a high-powered, Intel Corp. 80386-based PC, which allows him to add images and sound. Now Noblett is combining text and the bilingual database with images of the country and culture, as well as the authentic sound of native speakers. "It gives a complete context for listening to the language," he says.

• **Music to your ears.** Fred Hofstetter, who is the associate provost for academic computing and instruction technology at the University of Delaware in Newark, got into computers through music.

"When the videodisc was invented, it was a great way to study music," he says. Students could listen to the music and stop, start and replay sections while following the score on the screen.

Hofstetter didn't stop with just music courseware. Because he is called upon to give so many presentations, he developed Podium, a software product that allows a teacher to create an outline on a word processor and automatically translate it into a hypermedia script in which images, sounds, text and graphics are linked. "In the past, speakers were controlled by the slides. Now, each lecture is a new creation," he says.

For instance, if the student asks a question during a multimedia lecture prepared using Podium, the professor can type a frame number into the system and the desired image appears on the screen, even if the image was not used in the original presentation. A single videodisc stores up to 54,000 broadcast-quality slides.

• **Physics in action.** Edward F. Redish, professor of physics at the University of Maryland, says he worries that "students who come from high school see physics as a collection of unlinked facts. They miss the relationship of the parts and the underlying structure." To truly understand physics, the student "really must be active. Physics is not a spectator sport," Redish insists.

In an effort to involve students in physics, Redish is developing the Comprehensive Unified Physics Learning Environment, which combines material from a number of computer-based physics projects at three colleges — Michigan State, the University of Nebraska and Tufts University in Medford, Mass. — into one hypermedia system. It teaches through computer simulation, microcomputer-based laboratory work, interactive videodisc and

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery.

a physics education database.

• **Tell it like it is.** Computer technology is even revolutionizing the traditional lecture hall. At the University of Missouri in Rolla, students sit in the advanced technology classroom at desks equipped with an electronic response panel. The instructor, standing alongside a large projection screen, can present multimedia course materials and get instant feedback from students via the response panel — a new twist to the old surprise quiz.

The instructor at the podium can log onto any computer system on campus and execute any program, which is displayed on a large screen, explains Robert Davis, dean at the University of Missouri's School of Engineering.

For example, if the engineering department has an application running on the departmental LAN, the instructor can access that application, such as a spreadsheet, and run it for the class. The classroom was a joint project with IBM and has been in operation since October 1989.

• **But can it build a better mousetrap?** Davis, however, has taken academic computing beyond the classroom and applied it directly to the real world. The engineering school built a computer-integrated manufacturing (CIM) laboratory in which students can sit at a workstation, design something and, "if it meets the specification, manufacture it right there automatically, right through to packaging," he says.

The school is now developing a full-scale, industrial-strength version of the CIM lab for commercial manufacturing. Small companies that cannot afford the latest advanced automated manufacturing equipment will be able to buy time-sharing in the school's CIM facility. ◀

Radding is a free-lance writer based in Newton, Mass.

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Tips on how to get the job you want

An interview survival guide

team or alone? Do you learn better through on-the-job training, or do you expect a formal education program?

Next, think about your courses in college. Are your skills and interests highly technical, or do you prefer using technology to solve business problems? Are you intrigued by emerging technologies, or are the traditional languages and a mainframe environment more to your liking?

Develop an “ideal job” profile — a wish list of characteristics that are important to you in a position. You may not find a job that matches your preferences and expectations in every respect, but the self-awareness you’ll develop will enable you to determine what employment opportunities to pursue.

- **Identify those jobs that match your profile.** The next part of your homework assignment is to identify the types of careers your ideal profile matches and to research the industries and companies that sponsor these jobs. Information abounds in the placement office about the firms that plan to recruit on your campus as well as scores of other companies nationwide. Read company literature and job descriptions, but don't place too much emphasis on job titles alone when conducting your search. "Systems analyst,"

HAI MAVFORTH

for example, does not mean the same thing at all companies. Focus on the job responsibilities described in company information and compare that information with your ideal job profile.

It may be helpful at this stage to talk with professors and any business contacts you have. Most professionals, on campus as well as in industry, are willing to spend time helping college students sort through the variety of available job options.

Company recruiters are spending more time educating faculty about career opportunities at their firms, so professors may be helpful in recommending companies that have the type of job you're seeking.

Attend information sessions and presentations that companies sponsor on campus. Develop a list of companies you'd like to pursue, based on what you've learned about them.

● **Prepare for the interview.** Having done the preparation work, it's time to focus on developing and polishing the skills you'll need to function effectively in the interview itself. Interviews have been called "a conversation with a purpose," and when conducted well, they should

meet the objectives of both interviewer and student.

For example, company representatives seek to determine how well candidates measure up to their selection criteria. Students have an opportunity to gauge how well positions meet their ideal job profiles and ask questions not addressed in company literature.

Bookstores and campus career centers are well stocked with books and videos on interviewing skills, although their quality tends to vary. Be wary of anyone who guarantees you'll get the job you want; there are too many variables in any interview situation to make such a promise. The value in these instructional devices comes when they tell about different types of interviews and questioning strategies. You should learn to recognize questioning strategies so you can respond appropriately when you're in the hot seat.

Take advantage of all these resources and services to master the mechanics of the interview process, but avoid developing a robotic "canned" presentation. Spend time with family and friends responding to the sample questions that are included in

interviewing skills texts, but don't over-rehearse your answers. Most interviewers are not impressed by a candidate who seems determined to recite a self-promotional speech regardless of the questions asked.

● **Recognize the interview and interviewer.** Although this is true of students in every academic discipline, my research shows that information systems and electrical engineering majors are more likely to experience special challenges during the interview process.

Here are the types of interviewers you're likely to encounter:

Personnel types: Many companies send professional recruiters to campus to conduct initial screening interviews, or else they require that you visit with a human resource representative to fill out necessary paperwork if your first interview is held at the company.

Although such recruiters are usually well informed about positions available and company benefits, they often lack any technical background. Your best approach in these initial interviews is to focus on the

Continued on page 50

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Continued from page 48

nontechnical skills the position requires and to help the recruiter see how you match the job overall. Describe any technical projects or work experience in general business terms and do not attempt to dazzle or intimidate recruiters with buzzwords; they won't understand you at best, and they may well resent your showing off.

Technical line managers: An increasing number of companies are sending systems and engineering professionals to campuses to conduct interviews, a development that is generally welcomed by students who know they can ask technical questions and receive knowledgeable answers. It is not unusual, however, to find that line managers have limited knowledge about the hardware and software you've used on campus.

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment — and to convince the managers that you possess the underlying logic skills and aptitude to learn their systems quickly.

Untrained interviewers: Although this may sound absurd, don't assume that the person conducting your interview has

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment.

been trained to do so or is even comfortable sitting across the desk from you. A disturbing number of companies — from major corporations to small high-tech firms — send staff to campus who have no idea what questions to ask or how to evaluate candidates. If you sense that this is the case, take the opportunity to summarize for the interviewer what your educational and work experiences have been and describe how you qualify for the position being offered.

I often ask recent graduates what they know now that they wish they had known

when they started their job search. The recurring theme I hear in research I conduct with college students and recent graduates is this: "The work load involved in finding a job is like carrying another course!"

Why bother investing the time to prepare? Although it's generally true that the demand for information systems and electrical engineering graduates is greater than the supply of candidates, that may not be the case for the specific jobs you choose to pursue. Doing your homework — determining what type of position you want, investigating appropriate companies and developing your interviewing skills — will give you an edge over your competition.

More importantly, it will give you the confidence to know you're well matched to the job and will provide you with the knowledge and skills not only to survive but to shine in your interview. ◀

Scott is president of M. E. Scott & Co., a college recruitment consulting and training firm based in West Hartford, Conn. She is former director of staffing at Aetna Life & Casualty.

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**As IS execs compare pay stubs, jobs in the Big Apple
and positions in securities get the big bucks**

By David A. Ludlum

If you're a top information systems executive working in wholesale or retail trade in Arizona, congratulations. Your income is growing fast compared with the salaries of your colleagues in other industries. Factor in your low cost of living, and the numbers look even better.

When it comes to compensation, some IS professionals are gaining ground at a faster clip than others, according to *Computerworld's* fourth annual salary survey.

The variations do not just reflect industry conditions and geography. Compensation is rising faster for some positions than for others across the board. This year, pay for IS managers or supervisors reporting to the top IS executive is up 14% from the level reported last year. Meanwhile, compensation for communications specialists and database analysts has risen only 3%.

The more than 1,500 IS organizations responding to the survey report an average departmentwide salary increase of 5.7% for this year. That compares with nationwide increases of 5.7% for all executives and 5.4% for all salaried employees, according to William M. Mercer, Inc., a compensation consulting firm in Deerfield, Ill. Meanwhile, the U.S. government's consumer price index has risen 5.8% through July of this year.

Senior systems analysts, senior programmer/analysts and

senior operating systems programmers also registered big gains since last year's survey, with compensation up about 10%. Laggards include database managers and administrators; they gained only 4%.

During the four years *Computerworld* has conducted its survey, top IS executives' salaries have jumped the most, rising 15.5%. Senior systems analysts and senior programmer/analysts have done well over the four years, too, along with systems and programming managers. Data center shift supervisors, communications managers and senior programmers have chalked up the smallest overall gains.

With the great value IS organizations now place on business knowledge and interpersonal skills, "pure" programmers tend to get salary increases that just keep up with the cost of living, says Richard Wonder, national director of the IS division at recruiting firm Robert Half International, Inc. Meanwhile, systems analysts — and programmers with the analytical skills expected of systems analysts — make more money.

"As time goes on, there'll be less need for pure back-room coders, because the trend in IS is toward end-user computing, decentralization and people who have business and technical skills," Wonder says.

The average salary for information center managers rose slightly this year, but it remains nearly \$1,600 below its 1987 level. Recruiters attribute

AVERAGE SALARIES AND BONUSES

	Average annual salary	Average additional compensation	Average total compensation	Average years of IS experience
IS MANAGEMENT				
CIO/VP/Director of IS	\$68,690	\$8,581	\$75,611	16.0
IS manager/Supervisor	\$55,236	\$4,734	\$58,843	13.0
END-USER SUPPORT				
Manager, end-user computing	\$47,601	\$2,608	\$49,463	10.1
Information center manager	\$45,179	\$2,650	\$47,100	10.2
LAN manager	\$39,970	\$1,999	\$41,177	6.6
PC specialist	\$32,321	\$1,451	\$33,306	5.1
COMMUNICATIONS				
Network manager	\$48,658	\$2,702	\$50,493	10.0
Telecommunications manager	\$48,611	\$2,749	\$50,578	10.6
Communications specialist	\$37,271	\$1,445	\$38,231	7.7
SYSTEMS AND PROGRAMMING				
Systems and programming manager	\$53,549	\$3,630	\$56,159	12.9
Project manager	\$49,345	\$2,246	\$50,852	10.8
Senior systems analyst	\$44,569	\$1,788	\$45,669	10.4
Systems analyst	\$38,525	\$1,782	\$39,617	7.4
Senior programmer/Analyst	\$39,656	\$1,696	\$40,754	8.9
Programmer/Analyst	\$33,819	\$1,306	\$34,659	5.5
Senior programmer	\$33,911	\$1,105	\$34,631	6.5
Programmer	\$27,581	\$1,125	\$28,312	3.2
TECHNICAL SERVICES AND OPERATIONS				
Technical services manager	\$53,544	\$3,174	\$55,799	13.0
Senior operating systems programmer	\$47,059	\$1,323	\$47,886	11.2
Operating systems programmer	\$39,355	\$1,301	\$40,196	7.3
Data center or operations manager	\$41,527	\$2,005	\$42,878	12.1
Data center shift supervisor	\$30,184	\$1,197	\$30,926	8.5
DATA CENTER AND DATABASES				
Database manager/Administrator	\$49,384	\$2,193	\$50,938	10.5
Database analyst	\$41,594	\$1,489	\$42,561	8.0

the declines to a downgrading of the position; as information center managers moved on, they were succeeded by less experienced people.

This year's survey finds top IS executives earning a total compensation of \$75,600 — a fraction of what IS chiefs at the biggest firms in the most competitive job markets make. However, it is a significant outlay for the survey's cross-section of small to large firms across the U.S. "In a lot of communities, someone making \$70,000 is one of the wealthiest people," says Skip Tolette, an executive recruiter at Schmitt Bishop Tolette.

The organizations responding to the survey report average revenues or assets of \$864 million. However, for three-fourths of the companies, that total is less than \$500 million. At the largest companies, the compensation for top IS executives is 38% greater than the overall average.

The really big bucks in IS go to a smaller group of highly visible executives. Jay Gaines, a New York executive recruiter, likens the arrangement to Hollywood's star system. "There's an awful lot of dollars chasing a handful of people," he says. "I think you have 50 top guys in the country who are on everybody's hit list." Only about 20 of them command pay of \$750,000 or more, Gaines says. Individuals at Wall Street's major investment banking firms lead the list.

BIG APPLE, BIG BUCKS

This year's survey again finds top IS executives in New York making more money than their colleagues in other locations. New Yorkers hold a 25% lead over their

Systems analysts — and programmers with the analytical and interpersonal skills expected of systems analysts — make more money.

counterparts in Boston, home to top IS executives with the second biggest paychecks.

The jobs in New York pay a healthy premium even after compensating for the high cost of living there. One reason: There's a lot of competition for the best IS talent in New York. Another reason is that people demand a premium for working there. "It's a tougher place to get people to move to," Tolette says.

The regional ranking of pay for top IS executives does change when adjusted for variations in the cost of living. The Phoenix/Tucson area moves up the most after the adjustment — from seventh place to fourth. There's a strong demand for computer professionals in Arizona because the region has attracted a lot of software companies in recent years, says Dick Minogue, director of U.S. cost-of-living services at Associates for International Research, Inc., a compensation consulting firm in Cambridge, Mass.

The regional variations in pay for top IS executives apply to smaller companies

more than big corporations, recruiters say. Bigger corporations in the outlying regions compete with companies in large cities for top IS executives, so they have to pay as much as those companies do.

Since last year's survey, top IS executives in wholesale and retail trade have bettered their lot compared with their colleagues in other industries. In 1989, the pay for CIOs and vice-presidents of IS was lower in that industry than in all other fields except education and government. This year's survey puts top IS executives in wholesale and retail trade in fourth place — ahead of their counterparts in insurance, manufacturing and health care.

Firms in wholesale and retail trade have been turning to information technology to handle crucial functions such as automating inventory control, says Bob Lemke, a consultant at the William M. Mercer office in Chicago. "They're having to buy talent to catch up to the changes other industries have already made," he says.

Meanwhile, compensation in industries that have traditionally paid the most for IS talent are steady or dropping when bonuses are taken into account, recruiters say.

The big spender image of financial services also looks less certain when one looks at stock options, Gaines says. The options tend to be less valuable at service companies than in manufacturing concerns, where they can be worth \$100,000 or more for top-paying IS positions.

Programmers and analysts do not typically get stock options, but there is growing interest in paying them overtime for extra work, Lemke says. "I think the trend is to pay more straight-time overtime rather than comp time," he says.

Experience in hot technical areas can also add to pay for programmers and analysts. According to Steve Joffe, a vice-president at recruiting firm Source Services Corp. in Paramus, N.J., the hot areas in applications development today include mainframe, on-line database systems, especially using IBM's DB2; midrange systems using IBM's RPG III language or Digital Equipment Corp.'s VAX/VMS operating system; and personal computer systems incorporating relational databases and local-area networks, as well as Unix, C or Windows. ◀

Ludlum is a former *Computerworld* senior writer.

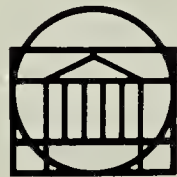
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Some walls are higher than others

Lack of understanding, recognition sometimes mars overall contentment in IS

By David A. Ludlum

The Berlin Wall has fallen, and countries in Europe are opening their borders to one another. But here in the U.S., information systems people still suffer from a feeling of isolation.

Overall, IS people are more than happy with their calling, according to *Computerworld's* fourth annual job satisfaction survey. However, when there is discontent, IS vice-presidents and programmers say, it is often because top managers and computer users do not understand the complexities of IS work or appreciate its importance.

A little more than half the people responding to the survey say they're satisfied or very satisfied with their current positions. Another quarter say they're somewhat satisfied with them.

Overall, the respondents agree that IS is an exciting profession, albeit a high-pressure one. Ask them what they like

most about being in IS, and they're likely to say challenge, followed by technology and variety (see chart at right).

One big challenge is watching costs. IS people need to squeeze more out of old systems and make sure that new technologies are cost-effective, says Hannah Foster, senior vice-president of IS at The Coast Distribution, a distributor of parts for boats and recreational vehicles in San Jose, Calif.

Although costs of certain technologies are falling, the expense of specialized IS training is growing, she says.

Technology has moved up on the list of things the respondents like about their profession: It is the No. 2 choice in this year's survey, up from No. 4 last year.

During the last few years, there has been a lull in exciting new technologies, according to Michael Sepe, IS manager at Irvine Ranch Water District in Irvine, Calif. Today, technologies such as imaging and opti-

cal storage promise to create new ways of doing business, he says.

What the respondents liked least about their profession is related to problems with man-

agement and end users: poor communication, a lack of understanding and recognition of IS work and users' demands, complaints and mistakes.

The messages that the

Two-edged sword

Change turns up as both a blessing and a curse when IS people list the things they like most and least about their work



What do you like the most?

1. Challenge

"We want to maximize and optimize the use of existing systems, not just change because there's something newer or better."

HANNAH FOSTER
SENIOR VICE-PRESIDENT FOR IS
THE COAST DISTRIBUTION

2. Technology

3. Variety

4. Constant change

5. Problem-solving



What do you like the least?

1. Communication

(Lack of communication with or recognition by management)

"Top managers don't communicate effectively what they want technology to do for them. If you allow them to be vague, that's all they are going to do."

LARRY DAVIS
MIS OPERATING OFFICER
SERVICE STAR CORP.

2. End-user mistakes and demands

3. Stress/Pressure/Burnout

4. Long or odd hours

5. Ever-changing business and technology Unrealistic deadlines (tie)

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3. Variety of responsibilities	3.13*
4. Success of the company	2.94*
5. Opportunity for advancement	3.23*



*On a scale of 1 to 4: 1 is very dissatisfied and 4 is very satisfied.

respondents would most like to pass on to top management are to improve communications, interaction and teamwork and to give IS people more recognition and involvement in decision-making.

"Improve communication" is the message from Larry Davis, MIS operating officer at Service Star Corp., a hardware, lumber and building materials wholesaler in Butler, Pa. His organization has created a customer information system that he says has far-reaching implications, but management needs to convince employees to change their ways and use it. "Its usage is optional until we get effective communication from top management that it shouldn't be optional," Davis says.

Managers continue to be frustrated by senior executives who don't understand technology. Gerard E. Tarpey, associate director of management and computer in-

formation systems at Pace University in New York, says he wishes that top managers knew enough about technology to understand when it's time to upgrade equipment. "It's like pulling teeth to get the OK for added horsepower," he says.

That lack of understanding can trickle down in an organization. IS professionals complain that some computer users don't understand how difficult it can be to create information systems. "It's not just a matter of flipping a switch and getting a report out," says James Evans, a senior programmer and analyst at Systematics, Inc., a facilities management company based in Little Rock, Ark.

Foster is troubled by a more general lack of understanding of IS, particularly the perception that IS organizations are somehow different and that IS people are "techno-nerds." IS people usually possess

a clear understanding of business needs, she says.

Users and top managers also fail to appreciate the significance of IS work, survey respondents say. In developing systems, IS people create a "hidden infrastructure" and change the way business is conducted throughout an enterprise, says Mike Whaley, MIS/DP manager at Job Opportunities, a nonprofit job training agency in Reno, Nev.

"There are a lot of things you tailor, and therefore, you subtly change the way decisions are made," Whaley says. Training people to use computers also makes an impact on the enterprise that most people don't appreciate, he says.

STRUCTURALLY FRUSTRATED

These misperceptions, misunderstandings and tensions can leave IS people frustrated. When asked about their biggest frustration, slightly more than half of the respondents point to office politics. As IS organizations gain clout within their enterprise, people in other areas can view the changes as empire building, Sepe says.

The IS organization at Irvine Ranch Water District is taking charge of telemetry systems used for remote control of water supplies — an area that had been the bailiwick of an engineering group. That change has created turf battles. "Engineering people say, 'You guys print paychecks. What do you know about telemetry?'" Sepe says.

Evans is also frustrated by politics. He recalls a client of his company ousting an IS consulting firm — wrongly, he says — after the consulting firm had cut back on the role of some IS executives. Those executives had the political clout to fight back.

One way of gaining political clout is to move into the executive suite. But three-fourths of the respondents to the survey say their company's IS department does not provide the right opportunities to advance to non-IS management positions.

An alternative to the move to a non-IS management position is to change jobs. Almost one-third of the respondents say they are always looking for job opportunities. One-fifth of middle managers also have an eye out for opportunities, compared with 16% of senior executives and 31% of IS professionals. ◀

Ludlum is a former *Computerworld* senior writer.

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INTERGRAPH

Top IS Users Soar Above Tough Times

By Michael L. Sullivan-Trainor and Joseph Maglitta

Gone are the days when information systems could hide in the back office, sheltered from the turbulent winds of corporate change. As technology plays a greater role in determining company success, information systems professionals are facing the same challenges as their peers in other front-line departments.

Nothing illustrates this shift more clearly than *Computerworld's* 1990 Premier 100 rankings. Each of the qualifying companies exemplifies the new role of IS.

Now, rather than focusing only on the latest IBM announcement, *Premier 100* executives are grappling with the various challenges of their industries. Financial services firms such as Paine Webber, Inc. are struggling with Wall Street's woes. Defense contractors such as General Dynamics Corp. are anticipating large reductions in their government business. Retailers such as Sears, Roebuck and Co. are battling reduced consumer spending. All the companies on the list are battenning down the hatches for the looming recession.

However, the biggest factor that causes these companies to rise above various business booby traps is their continued commitment to IS — despite corporate performance dips and anxiety about the future. Not coincidentally, faith in IS corresponds closely to a company's ability to remain profitable despite tough times.

For example, MCI Communications Corp. — the only company to rank in the *Premier 100* Top 10 three years in a row — repeats its first-place ranking in 1990 with a 61% increase in profitability from 1988 to 1989 and a 40% increase in its IS budget (from \$285 million to \$400 million). These achievements are the products of continued victories in the organization's competi-

tive battles with its long-distance service rivals as well as expansion and strategic alliances.

FMC Corp. rockets to second place this year with a \$110 million IS budget (an increase of 10%) and significant investments in new equipment. For example, IS spending in the company's agricultural chemicals group has increased 200% in the past three years. During that time, three plants were upgraded on the industrial chemicals side of the business, along with investments in computer systems for sales and marketing. At

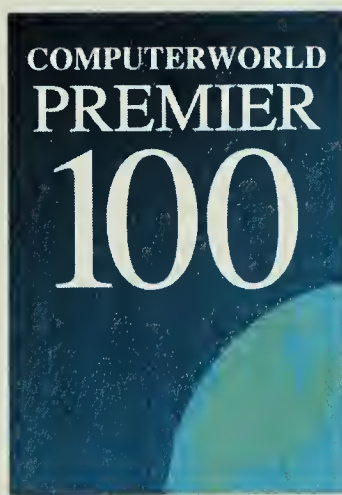
the same time, the company's profitability increased 21% from 1988 to 1989. All these events occurred at a time of aggressive competition in the chemicals industry and threatened defense cutbacks, which could affect half the company's business.

American Airlines and its parent, AMR Corp., continue to wing along atop the transportation industry. The company reduced its billion-dollar IS spending by less than 1% while maintaining its commitment to Sabre and planning a major downscaling of the

massive computer reservations system. Profit for AMR was also down 5%, contributing to its slippage in rank to fourth overall.

Other companies continue to be committed to technology despite profit problems — a tribute to the IS executive's ability to support the technology program in difficult weather. Sears vaulted to 12th place in 1990 on the strength of a 20% budget increase and profit growth of 3.8%. Yet the \$54 billion giant is struggling in 1990, and cost-reduction pressure is mounting. Nevertheless, a strong management commitment to technology continues and may help pull the company back into the limelight.

Bankers Trust New York Corp. is riding a roller-



coaster earnings cycle. The volatility of South American loans made it No. 1 in profit growth in 1988 and dealt the company a loss in 1989. However, the bank's commitment to IS remains unswerving.

Overall, the *Premier 100* Top 10 increased spending by an average of 8%, or 5.4% of their total revenue, down 0.2% from last year's Top 10. Investments in current computer systems increased by an average of 6%, but the ratio to revenue actually decreased by 0.2%. Investments in personnel also decreased by an average of 5%, and training expenditures remained

about even. The growth area is personal computers and terminals, which increased by an average of 12%.

As significant as the statistics are, the way these investments are applied makes the difference between *Premier 100* winners and the rest. One key ingredient to a recipe for IS effectiveness is the ability to carry out a unified vision of where technology integrates with business requirements.

For example, MCI is successful because its IS investments are intrinsic to the development and growth of its network, which is the single most important element

in the company's arsenal.

As important as insight into systems applications are the tools to carry out the functions. All of the top companies employ current technology to get the job done, but some stand out more than others.

Merck and Co.'s Albert Cinorre, vice-president of computer resources, oversees an IS budget of \$185 million. Traditionally a Wang Laboratories, Inc. shop, Merck has turned to the latest IBM systems to speed drug development, particularly in the area of molecular modeling.

Such investments in the latest systems

THE 100 MOST EFFECTIVE USERS OF INFORMATION SYSTEMS

1	MCI Communications Corp.	35	Caterpillar, Inc.	69	Rockwell International Corp.
2	FMC Corp.	36	Salomon, Inc.	70	Freeport-McMoran, Inc.
3	Bankers Trust New York Corp.	37	Monsanto Co.	71	The Travelers Corp.
4	AMR Corp.	38	Merck & Co.	72	McGraw-Hill, Inc.
5	Union Texas Petroleum Holdings, Inc.	39	Contel Corp.	73	Amax, Inc.
6	General Dynamics Corp.	40	Bankamerica Corp.	74	AT&T
7	Paine Webber, Inc.	41	Grumman Corp.	75	The Penn Central Corp.
8	Norwest Corp.	42	Polaroid Corp.	76	J. P. Morgan & Co.
9	Banc One Corp.	43	The Timken Co.	77	Lockheed Corp.
10	Gencorp, Inc.	44	General Re Corp.	78	Sun Co.
11	The Dun & Bradstreet Corp.	45	Northeast Utilities	79	Abbott Laboratories
12	Sears, Roebuck and Co.	46	The B. F. Goodrich Co.	80	Ambase Corp.
13	Gillette Co.	47	Centerior Energy Corp.	81	National City Corp.
14	Chicago & North Western Transportation Co.	48	The Mead Corp.	82	Duke Power Co.
15	Signet Banking Corp.	49	The Boeing Co.	83	Becton, Dickinson & Co.
16	Martin Marietta Corp.	50	Baxter International, Inc.	84	Mutual Benefit Life Insurance Co.
17	Security Pacific Corp.	51	Northrop Corp.	85	Xerox Corp.
18	United Telecommunications, Inc.	52	Rohm & Haas Co.	86	Louisiana Land & Exploration Co.
19	Corestates Financial Corp.	53	Massachusetts Mutual Life Insurance Co.	87	Carter Hawley Hale Stores, Inc.
20	The Dow Chemical Corp.	54	New York Life Insurance Co.	88	Colgate-Palmolive Co.
21	GTE Corp.	55	CSX Corp.	89	Aluminum Co. of America
22	Bell Atlantic Corp.	56	Wells Fargo & Co.	90	Valhi, Inc.
23	Ameritech Applied Technologies	57	The Prudential Insurance Co. of America	91	Inland Steel Industries, Inc.
24	Allied-Signal, Inc.	58	Primerica Corp.	92	Eli Lilly & Co.
25	Air Products and Chemicals, Inc.	59	United Technologies Corp.	93	Merrill Lynch & Co.
26	American Express Co.	60	The Pittston Co.	94	The Mutual Life Insurance Co. of New York
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31	Atlantic Richfield Co.	65	McDonnell Douglas Corp.	99	The Aetna Life & Casualty Co.
32	Oryx Energy Co.	66	Textron, Inc.	100	Jostens, Inc.
33	Phillips Petroleum Co.	67	Quantum Chemical Corp.		
34	Pacific Mutual Life Insurance Co.	68	Mobil Corp.		

must be tempered today with a keen awareness of budget constraints. Cost efficiency is a major theme among the most effective users of IS. At FMC, for example, systems are purchased at the beginning of their cycle below peak costs and are jettisoned before their value expires. But more than that, a system will not cross the threshold of the organization's computer center without a proven business requirement.

Other firms emphasize process and integration with the company culture as subtler ways to fashion effective IS groups. General Dynamics focuses on total quality management, where less than 100% quality is unacceptable. Such concentration speeds application development by involving more user participation and embeds the philosophy of doing it right the first time into the organization's culture.

Last but still key is an emphasis on the people who run the IS operations. Companies such as Paine Webber and Union Texas Petroleum Holdings, Inc. empower those involved in IS — both users and technical specialists — by giving them control over their work and exposure to both technical and business requirements. In fact, Paine Webber recently fired 71 outside consultants and entrusted their projects to internal staff to cut costs and show faith in the staff at the same time.

The *Premier 100* also tells the story of companies that, despite strong efforts, find it difficult to keep up with the highfliers in the choppy IS stratosphere. Among these are Baxter International, Inc., which fell from the lofty position of eighth overall and No. 1 in manufacturing last year to 50th this year because of significant downsizing and restructuring, leading to a \$50 million reduction in the IS budget. Michael Heschel, Baxter's IS chief, moved over to head IS at Security Pacific Corp.

Modest increases in spending and profit at Dow Chemical Co., another industry winner last year, caused it to be passed by other fast-rising companies. The company relocated five spots lower on the list, with continued data center consolidations as the major activity.

Lockheed Corp. toppled down on the list because of a large reduction in profit accompanied by changes caused by a restructuring of the aeronautical group, shutting down operations in California and consolidating in Georgia.

Other companies, such as Northeast Utilities, which captured the top rank overall in 1988, simply failed to keep up

Opting for a lean, mean IS machine

Leaner, more supple and closer to the action is how firms want their IS organizations, IS executives say.

Rather than centralizing or decentralizing, executives report that their organizations are crafting new, hybrid structures combining both forms. In fact, a survey of 92 companies reveals that more than half (56) are now operating "mixed" IS organizations. Another 24 retain centralized structures, while 12 are fully decentralized.

Proponents of mixed structures include: FMC Corp., General Dynamics Corp., Abbott Laboratories, Aluminum Co. of America and Pacific Mutual Life Insurance Co. Centralization is favored by Paine Webber, Inc., The Travelers Corp. and Signet Banking Corp. Among the larger decentralized companies are American Express Co., Gencorp, Inc. and United Technologies Corp.

According to IS managers, the new hybrid structures let organizations take advantage of local access to technology while still providing overall guidance for systems efforts from the central organization.

An important related development is the fast-growing popularity of data center consolidation as a cost-cutting measure. All told, 43 of the companies report that they have merged or consolidated data centers during the last year. Another 27 expect to do so in the coming year.

Typical among consolidators is Edwin Sherin, senior vice-president of IS at Primerica Corp., who reports: "We will continue to implement a data center consolidation effort, which will yield significant expense savings."

Ameritech reports data center consolidations from 14 to four during a five-year period.

Consolidation is popular among aerospace firms, which are also restructuring and downsizing in anticipation of federal defense budget cutbacks.

MICHAEL L. SULLIVAN-TRAINOR AND JOSEPH MAGLITTA

with the pack. Modest budget and value increases of less than 2% and personal computer and terminal boosts of less than 10% coupled with a 10% profit drop caused the company to fall further down the list.

All the ups and downs of life at the top of IS evidenced by the *Computerworld Pre-*

mier 100 show the battle scars of the 1990s. And to think it's only the beginning of the decade. ▶

Sullivan-Trainor and Maglitta are *Computerworld* senior editors.

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Fashioning systems for the future

**Levi Strauss' Rund designs readiness for change
into world's largest apparel firm's IS**

By Jean S. Bozman

The art of managing information systems starts with the task of designing them well. That is the thesis of Donna Rund, vice-president of information engineering at Levi Strauss & Co., who believes that thinking about computer-aided software engineering (CASE) is just as important as having programmers crank out lines of code.

To illustrate her point, Rund draws pictures of her business model of San Francisco-based Levi Strauss. It is a functional representation of intersecting circles, matching all the business units to the systems that support them. It is really a blueprint of the underpinnings of the world's largest apparel company. With annual revenue of \$3.6 billion, Levi Strauss operates on four continents and distributes its products around the world.

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself," she says, sitting in her brick-walled office overlooking San Francisco Bay. "Our challenge in the '90s is to focus on *what* you do in DP, not on how you do it."

PEOPLE SKILLS

The very nature of IS is changing, and the people who work at information engineering, as Rund calls it, must change their job descriptions. "We're moving our people to be designers and systems integrators," she says. "There's still a need for technicians. But we're going to have a merging of skill sets between IS and the end user. People skills — like the ability to negotiate, facilitate and elaborate — will make our people into knowledge workers."

Those workers have to be able to extract systems requirements from business unit managers who have never programmed a personal computer. They have to be able to listen — and to travel, if necessary — to where the business units are located.

They also have to build systems in a modular fashion so that, in Rund's words, "applications development products can be popped in and out without affecting the overall systems design." They can no longer afford to be cloistered technicians, toiling away in isolation, she adds.

For example, Rund envisions that applications written for an IBM 3090 mainframe at headquarters will one day be transferable to IBM Application System/400s at Levi Strauss factory sites



CINDY CHARLES

RUND WANTS Levi Strauss' staff to gain business skills, develop flexible systems

around the world. Levi Strauss is currently using Knowledgeware, Inc.'s Information Engineering Workbench as the basis for its CASE design.

"Beyond that, the challenge will be to manage applications as the business changes," Rund says. One way to do that, she says, will be to issue new application "releases" in much the same way that software vendors do.

ADAPTABLE ATTITUDE

Her statements are in sync with the evolving management philosophy at Levi Strauss, which has recently undergone a leveraged buyout and drastic downsizing in an effort to stay competitive.

The watchword at the firm is flexibility, as IS planners employ electronic data interchange, IBM mainframes and relational databases to keep pace with other clothing manufacturers in Europe and the Far East.

"We are shifting the corporate asset from being the application code to being the design [of that application], which has lasting value," says Bill Eaton, chief information officer at Levi Strauss. "The

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself."

Donna Rund
Vice-President of IS
Levi Strauss & Co.

specific products you use to write that code are not as important."

Rund, Eaton says, practices enterprise modeling. "In the information engineering area, Donna is providing the vision of the kind of systems we want to build: flexible, durable and responsive to changes in the technology environment," he says. "She is the glue that holds all of that together."

Today, Levi Strauss' worldwide IS staff numbers just 400, with about 325 in San Francisco and the rest supporting business units in Tokyo, Toronto and Brussels. "We've cut out many management layers so that it's really a very, very flat organization," says Bob Mann, director of applied information technology. Mann manages Levi Strauss' CASE strategy and works closely with Rund on data design issues.

GO TEAM!

To make that flattened organization work, Rund and the other 13 IS managers reporting to Eaton have to work on motivating their staff to act as a team. "Donna has a lot of energy," Mann says. "She's able to get a lot of buy-in across [information resources] rather than vertically. Flattening the organization only works if people feel empowered, if they feel they are creating part of the destiny of Levi Strauss." That feeling is enhanced by an employee stock ownership plan that was established after the buyout in the mid-1980s.

Rund, who was named to her current

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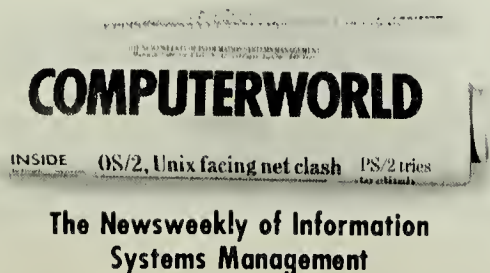


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position 2½ years ago, has been at Levi Strauss since 1980. Previously, she worked at several large banks and insurance companies as a software manager. In her off hours, she trains and shows horses. "It's like teaching a horse ballet, when you do it right," she says.

Rund wants IS workers to get out of the office occasionally so they can step back from their programming and concentrate on the larger issues of information architecture. "We've had two-day off-sites in which we discussed the role of a manager and what it will be like in the future," she says. "Systems analysts will be working in the user environment. And with the new technology that's coming along, you won't have to be a programmer to design a system."

HIGH ASPIRATIONS

Rund's IS leadership sessions complement those of the rest of the company, which has a 2-year-old "Aspirations" program handcrafted by top management. The Aspirations mission statement, endorsed by Chief Executive Officer Robert Haas, lists six key management touch-

The very nature of IS is changing, and the people who work at information engineering must change their job descriptions.

stones: new behaviors, diversity, recognition, ethical management practices, communication and empowerment.

The atmosphere at the Levi Strauss Plaza headquarters, along San Francisco's Embarcadero waterfront area, is relaxed. There is modern art on the walls, and attire is casual — often Levi Strauss jeans or jackets, in fact. Programmers work on IBM DB2 applications during the day and sit by the plaza fountain or sip a cup of cappuccino at a nearby cafe at lunch.

The same messages are brought home at periodic off-site leadership weeks led by top Levi Strauss managers. In

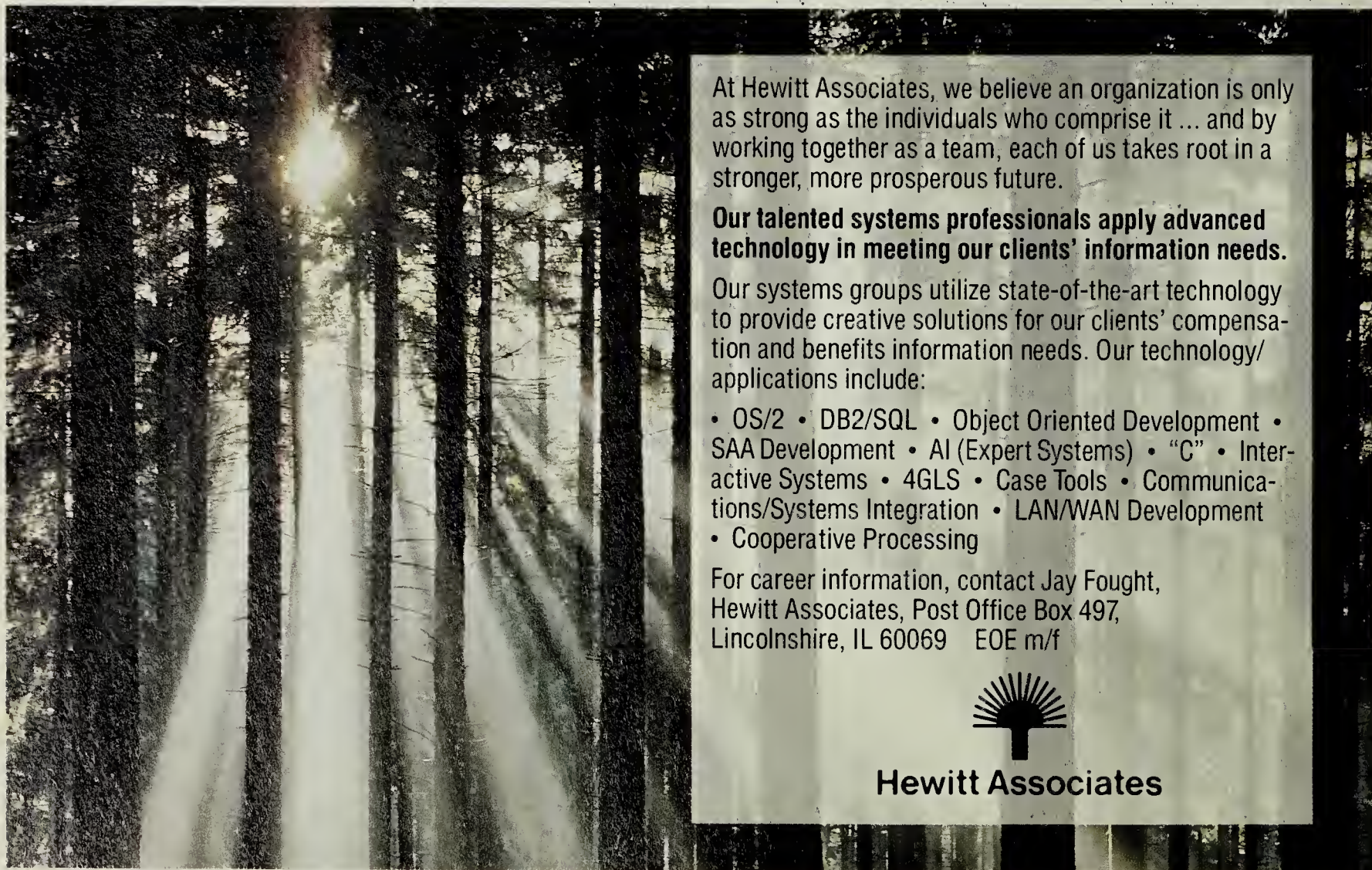
June, Rund took her turn leading a week-long off-site session in Santa Cruz, Calif. "Our off-sites are moving us ahead," says Hank Ahlgrim, manager of database administration.

"Our management has made it very clear to us that if you're not activating creativity and empowerment, if you're not pushing authority and responsibility to those nearest the action, you won't survive in the 1990s," he adds.

In the end, Rund says, it is the people of Levi Strauss' IS group that will enable the overall business plan — or slow it down. "It doesn't matter which hardware we're on or which telecommunications gear we have as long as that gear doesn't get in the way of moving the company forward," she says. "You have to have a vision of where you want to go and start working your way toward that vision. What we've been doing is learning how to adjust our internal business processes to a brand-new world."

Bozman is *Computerworld's* senior West Coast editor.

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Experiencing life at the top

Merrill Lynch's Peterson earned his way into top management's inner sanctum

By Amy Cortese

Tracking Merrill Lynch & Co.'s minute-to-minute stock performance on a personal computer in his corner office overlooking Manhattan's financial district, DuWayne Peterson does not look like your average information systems chief. Indeed, he is not.

Known as the million-dollar man because of his seven-figure salary [CW, Jan. 15], Peterson has accomplished what many IS executives are still striving for — entry into top management's inner circle.

"You couldn't be in a better position" in this industry, acknowledges the 58-year-old Peterson. But he stresses that his job goes beyond that of the typical IS chief.

As executive vice-president of operations/systems and telecommunications at the nation's largest retail brokerage house, Peterson oversees 12,000 employees and a budget of just over \$1 billion.

As testament to his important role at Merrill Lynch, he is an *ex officio* member of the executive committee, along with the chairman, president and a handful of other executive vice-presidents.

Peterson seems to have the right balance of technical and business savvy, colleagues say.

"DuWayne is very much a senior business executive at the top of the organization. With a firm like Merrill Lynch, that's what you need," says Bruce Turkstra, Merrill Lynch's senior vice-president of global IS.

"He has good political sense and social sense," adds Gerry Eli, director of



ANDY FREEBERG

THE MILLION-DOLLAR MAN seeks to control costs and deploy cutting-edge technology

global IS. "He fits right in with upper management."

Peterson cites three success factors for aspiring IS executives: a solid track record of performance, good communication skills and the ability to translate technology into business terms. "The key is establishing credibility with management," he says. "The compliment I always get is that I make it sound so easy. You have to take the mystery out of it."

An only child born in Evanston, Ill.,

Peterson spent most of his youth in the Detroit area. His career has taken him from Detroit to California to New York, where he and his wife now reside in an Upper East Side co-op. An avid skier, tennis player and golfer, Peterson manages to return to his Los Angeles-area home a few times a year to pursue those interests.

After graduating from MIT and serving a brief stint as a civil engineer corps officer in the U.S. Navy, Peterson joined Honeywell, Inc.'s temperature

control business in Detroit, as his father had done. When Honeywell started getting involved with computers in the 1960s, Peterson was intrigued and returned to school with plans to get into the dawning industry.

Armed with an MBA from the University of California at Berkeley, Peterson went back to Detroit to work in IS at Ford Motor Co., modernizing the company's operations and product development systems.

Since then, Peterson has served distinguished terms at Citicorp, RCA Corp. and, most recently, Security Pacific Corp., where he was executive vice-president of the bank's Automated Data Processing Group for several years.

Peterson came to Merrill Lynch in 1986. "There's been a lot of change since he's been here," Eli says, noting that the IS budget and staff have declined, and the group is more control-conscious.

As Wall Street continues to undergo brokerage industry contractions, Merrill Lynch has been one of the hardest-hit firms because of its freewheeling expansion during the boom years of the 1980s.

"DuWayne has a unique ability to let his people show initiative while establishing a vision."

Bruce Turkstra
Merrill Lynch

Peterson's charter has been to control costs while deploying technology to Merrill Lynch's strategic advantage.

In light of layoffs and budget cuts, some might resent Peterson's large salary, but colleagues defend it. "He deserves every penny of it. He's added 10 to 100 times more than that to the firm," Turkstra says.

Peterson says that his status gets him "a lot of notoriety," but colleagues describe him as first and foremost a family man. No doubt he has helped inspire two of his three children to become involved in the computer business: One is in telecom-

munications at Procter & Gamble Co., and another works in the computer center at Pacific Bell.

Peterson's management philosophy? "I like to hire the best people I can get my hands on, give them the authority and the tools they need to get the job done, then let them have some fun," he says.

Subordinates agree. "DuWayne has a unique ability to let his people show initiative while establishing a vision," Turkstra says.

Eli characterizes Peterson's informal, entrepreneurial style as "more California. He sets goals and expects everyone to live up to expectations."

Where do you go from the top? Peterson says he will finish out his working life at Merrill Lynch.

"I'd like to retire eventually, maybe do some consulting," he says. But when that time comes, he says, "you stop and take stock of your life. This business moves so fast."

Cortese is a former *Computerworld* Mid-Atlantic correspondent.

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Delivering data to the deal makers

Warner's Winski has the communications tools for life in the entertainment fast lane

By Clinton Wilder

Last year was the year of *Batman*, the Rolling Stones tour and the blockbuster \$13 billion merger of Warner Communications, Inc. with Time, Inc. It showed, more than ever, that the entertainment industry is driven by big hits, big bucks and big deals.

Information systems plays an increasingly important role in the fast-moving world of movie moguls and millionaire rock musicians. But Don Winski, executive director of corporate information services at Warner, knows that strategic systems are sometimes no substitute for power lunches or conference calls on car phones.

"Information is not just what's on a computer screen or on paper," Winski says. "Voice is information and is usually more important in closing a deal than classic hard data. It's hard to predict when a deal will click, but we [in IS] have to be ready."

Winski's personal accessibility is evident in his strong handshake, hearty laugh and the pile of comic books on his office coffee table. His speech flows quickly with a slight tinge of his Brooklyn birthplace, a style that he likes to call "a New York corporate accent."

Originally trained as a chemical engineer, Winski moved into operations research and has had a varied computer technology career with stints as a consultant, entrepreneur and IS executive. He and those who know him agree his business background is essential for success in the entertainment industry's fast lane, particularly in a culture led by deal-mak-

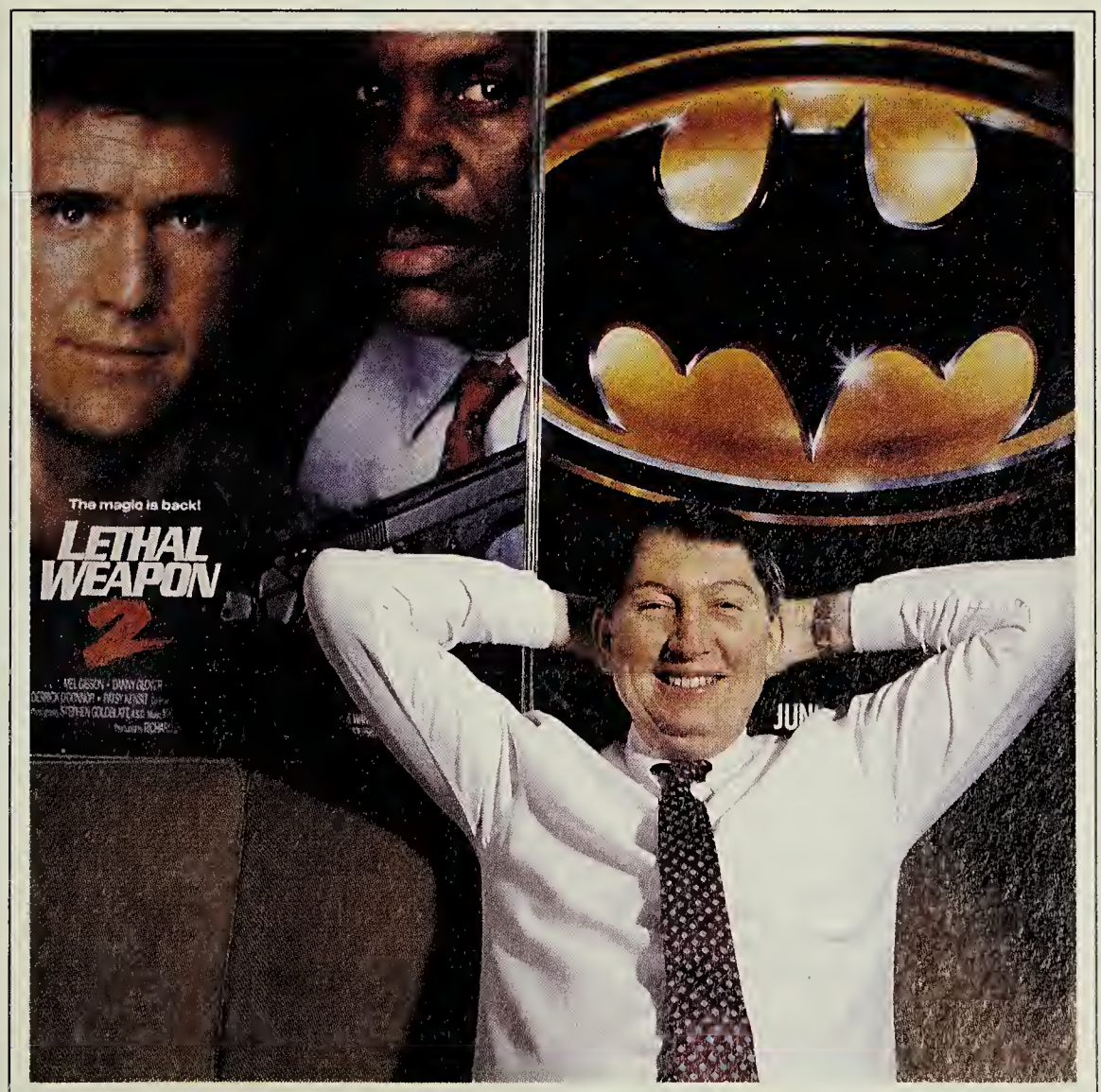
ing Steven Ross, Warner's chairman.

"It's a tough, take-no-prisoners business," says Jerry Mayfield, a principal at the DMW Group, a telecommunications consultancy that has worked closely with Warner. "Most guys would last about 15 microseconds in a job like that unless they can communicate at the business level."

Mayfield describes Winski as "forceful but subtle" in working with Warner's diverse business cultures,

which range from the blue jeans of acquired small record companies to the tailored suits of buyout financiers. "It was like hand-to-hand combat getting some business units onto the corporate network," Mayfield says. "Don was like an orchestra conductor bringing order to it."

At Warner, Winski forcefully advocates centralized network management and equipment purchasing for significant vendor discounts but is equally insistent on decentralized IS decision-



ANDY FREEBERG

WINSKI'S MISSION Is to provide leadership for a decentralized organization

making at the business unit level.

"Corporate headquarters does not have a monopoly on intelligence," he says. He defers explaining any IS projects in Warner's business units, saying, "I don't want to steal their thunder."

From his office in New York's Rockefeller Center, Winski says he has the necessary overview of Warner's computer and communications infrastructure to suggest strategic opportunities. "We try to be a catalyst and a facilitator but not take control," he says. "That can be hard for people from a traditional data center mentality."

Winski's mentality is anything but that. Armed with a master's degree and doctoral work in operations research at Brooklyn Polytechnic University, he joined Price Waterhouse as an electronic data processing consultant. His IS career continued at Royal Dutch Shell and Ingersoll-Rand Co., but, he says, "in my heart, I'm always a user."

He later became chief executive officer at a cellular telephone services business owned by Bell Atlantic Corp. He joined Warner in 1986 "by sheer accident" when

a headhunter called.

Although he was new to the entertainment business when he joined Warner, Winski says his IS background with user, vendor and consulting firms has given him the requisite people skills for a company such as Warner.

"I've worked with strategic planners, entrepreneurs and now with deal makers," he says. "They're all highly intelligent, highly sensitive people, and after enough years in the business, you build up a sensitivity in your fingertips in dealing with them. You get away from hard data — it's more personal."

Winski admits that it is fun living in a corporate world in which sharing an elevator ride with Robert Redford is not uncommon. "It makes me more interesting at cocktail parties," he says.

All those movies, records and cable television shows add up to a \$5 billion company with an IS budget of a hefty \$100 million. And Warner will soon swell to \$11 billion when it completes its merger with Time — whose offices are, ironically, connected to Warner's through a subterranean shopping con-

course below midtown Manhattan.

Winski is mum on the details of how the two huge IS operations will be merged but says he would like to see Warner's philosophy of a tight marriage between computers and telecommunications continue. "The information infrastructure is ineffective if you separate the two," he says.

It is at the business unit level that Winski believes the strategic systems must be developed to better serve Warner's stable of producers and performers. Computer systems may not find the next Tracy Chapman, but they can help keep the singer as a Warner artist after the talent scouts discover her. One system, for example, now provides clients with more detailed information about where their royalty payments are derived.

"Our philosophy is that the artist is always right," Winski explains. "The creative artist is the lifeblood of this company."

Wilder is *Computerworld's* senior editor, management.

Tips for success in the '90s

Ask 10 top IS executives what skills will be crucial in the 1990s, and you'll get one answer: the ability to look, think and act like a general business manager. *Computerworld* asked top IS executives to list what they consider to be the most important factors for success in the coming year. Here's what they say:

- 1 Build a competitive organization.** Bill Friel, vice-president of IS at Prudential Insurance Co., says he believes a competitive advantage comes from recruiting the right people, then motivating, training and retaining them.
- 2 Rethink business processes.** IS managers need to rethink business procedures with an eye toward simplification and greater customer satisfaction. Mutual Benefit Life Insurance Co. did just that, reducing the number of individuals who process an application for a policy from 19 to one.
- 3 Focus on customers.** "I want my people to think of the things they can do to improve the services we provide to the real customers," says Michael Zucchini, executive vice-president and chief information officer at Fleet/Norstar Financial Group in Providence, R.I.
- 4 Consider outsourcing.** Tougher competition and profit pressures will force more IS executives to take a hard look at hiring third parties to take over functions and services that traditionally have been done in-house.
- 5 Develop a global perspective.** "If you're involved with international business, you have to understand the

strengths you have in operating a telecommunications network around the world," says Robert Luft, who is currently group vice-president for chemicals and pigments at Du Pont Co. "If you don't have a competitive network," he says, "you have a real problem in your business."

- 6 Foster teamwork.** At Bank of Boston Corp., for example, uniting business managers and IS will be "one of the biggest challenges of the 1990s," says Kavin Moody, the company's director of corporate information and technology. Line managers are in the best position to envision changes in the way information systems are used, and their leadership invests projects with ownership.
- 7 Master expense justification.** More than ever, management will be saying, "'Hey, show me how this is going to make a buck on the bottom line,'" says Timothy Turnpugh, executive vice-president of operations and director of MIS at Seafirst Corp. in Seattle.
- 8 Avoid information overload.** Yes, it is possible to have too much of a good thing. The bottom line? IS managers must learn to be selective consumers of information.
- 9 Keep abreast of technology.** While developing a better grasp of the business is the key, top IS executives also need a broad understanding of technology, says Patricia Wallington, vice-president and CIO of the Information Management Division at Xerox Corp.
- 10 Stay within your budget.** Enough said.

Debunking the two-page resume myth

Saying everything you need to say will tell your prospective bosses everything they need to know

By Mark Duncan

Perhaps it is only the information systems profession, but job applicants, whether junior programmers or senior technicians, have somehow been convinced that a resume must be two pages — no more, no less.

Needless to say, it is utter foolishness to limit a description of your talents, skills and experiences on the basis of an inexplicable convention. The well-worn argument waged in favor of this convention is that managers are busy people and do not have time to read more than two pages of anything.

Nonsense!

Consider the following scenario: Acting as an intermediary, you deliver a four-page resume to your manager for a colleague. What are the chances of your manager scrutinizing the resume promptly? Now what if the president of the company hands your manager a six-page resume and asks him to weigh the strengths and weaknesses of the candidate? Chances are the manager will know that resume inside out by the next day. So, length is a poor criterion. Indeed, one should question the propriety of working for someone whose objectivity is determined by word count.

A resume's essential purpose is to act as a marketing tool, an advertisement used to convince a prospective employer (who is undoubtedly looking at many such advertisements) that you are the right

person for a job. But if your resume looks and reads like the others, why should it get special attention and treatment?

In business, the strategic imperative for organizations is to differentiate themselves from competitors, not only through product or service quality but also through eye-catching packaging and attractive side benefits. The same is true of resumes. A resume is your first — and possibly your most important — opportunity to differentiate yourself from rivals. Broadly speaking, content and appearance represent the two key opportunities for differentiation.

Why shouldn't your resume arrive in a customized envelope with a printed return address instead of a gummed label? Why shouldn't the envelope and paper be color-coordinated? Plain white stationery pales next to the aesthetic blues, grays and beiges available at most stationers.



In terms of format, there must be better and more practical alternatives to the underlined dates and company names, followed by a dry paragraph in incomplete and grammatically incorrect phrases. It may come as a surprise to some, but written English is governed by universal rules, regardless of context, that render inexcusable passages such as this: "Senior analyst on two systems. Project leader on one. Responsible for analysis, design and development. Supervised two programmers. Troubleshooting and maintenance skills."

Although the reader may extract the

information, he undoubtedly could do so more easily if it were written in correct English. If brevity is required, consider using a tabular format in which one column may have dates and position, another hardware and software and a third having company name and experience. Horizontal and vertical lines make the format truly tabular.

As for the appearance of text, the capabilities of word processors and desktop publishing software have opened up myriad possibilities. The fonts and print styles available mean no two resumes need ever look alike. Page layout must be pleasing to the eye and can now be enhanced by different print sizes, underlining and bold-facing to separate information or emphasize items.

Resume content is governed by common-sense criteria. Facts must be presented honestly and unambiguously. The reader must have no difficulty in extracting experiential data to match with job requirements. Keep jargon to a minimum.

Beyond this, a resume must also offer a certain comfort level for its subject. A resume is a very personal item and must therefore be a reflection of oneself in tone, appearance and style.

To be an effective marketing tool and serve its intended purpose, a resume must be perfect. Remember, you are trying to differentiate yourself from others. Even if it turns out that other people possess identical experience, the way that experience is presented may determine who is called for an interview.

Duncan is a quality assurance consultant at a large Dallas bank.

MBA's aren't always vital

In the end, experience in the real world often means more than an advanced degree

By Janet Mason

Although some bill it as the key to the executive suite, a master's degree in business administration holds no guarantee of career advancement for the information systems professional.

In some companies, an MBA can open the door to management or bring a larger starting salary. However, in most hirings and promotions, experience is weighed far more heavily than an MBA, some observers say.

Walter Popper, a principal at Index Group, Inc., a Cambridge, Mass., consulting firm, contends that an MBA is the crucial first step toward management.

Popper notes that techniques for automating software development, such as computer-aided software engineering, call for systems developers to possess a

greater understanding of their company's business. Increasing use of such tools should lead IS organizations to place a growing value on employees with a business education, he says.

John F. Rockart, director of the Center for Information Systems Research at MIT's Sloan School of Management, says an MBA can help IS people move into line management, increasing their earning potential.

At large consulting firms, an MBA can help technical professionals understand applications from the user's perspective, says Charles Emley, partner in charge of information technology consulting at Touche Ross & Co. About half the people Touche Ross hires have just received MBAs, while the rest are hired mainly

for their work experience.

Other observers stress that work experience can outweigh formal education. If the choice is between an IS professional with an MBA and one with solid experience working with users, says Roger Sobkowiak, a partner at Software People Concepts, Inc., a New Haven, Conn., recruiting firm, the one with experience will be chosen for a position.

At Boeing Computer Services in Bellevue, Wash., the IS staff members are encouraged to obtain MBAs

through a tuition reimbursement plan. The broader outlook they acquire with an MBA can help them better understand decisions made in the firm, says Elaine deLappe, the division's manager for human resources support services.

An MBA can be a tiebreaker in decisions on promotions or hirings, says Cameron Carey, president of Computer Security Placement Service, Inc., a recruiting firm in Northboro, Mass.

Can an MBA help boost IS earnings? Sobkowiak says it will not enhance them dramatically, while Emley says it can. Emley says that by completing a "first-class" MBA program, a corporate IS employee with a technical undergraduate degree and three to five years of experience might boost his pay \$5,000 to \$10,000. If he moved to a consulting firm, his pay might increase by \$10,000 to \$15,000.



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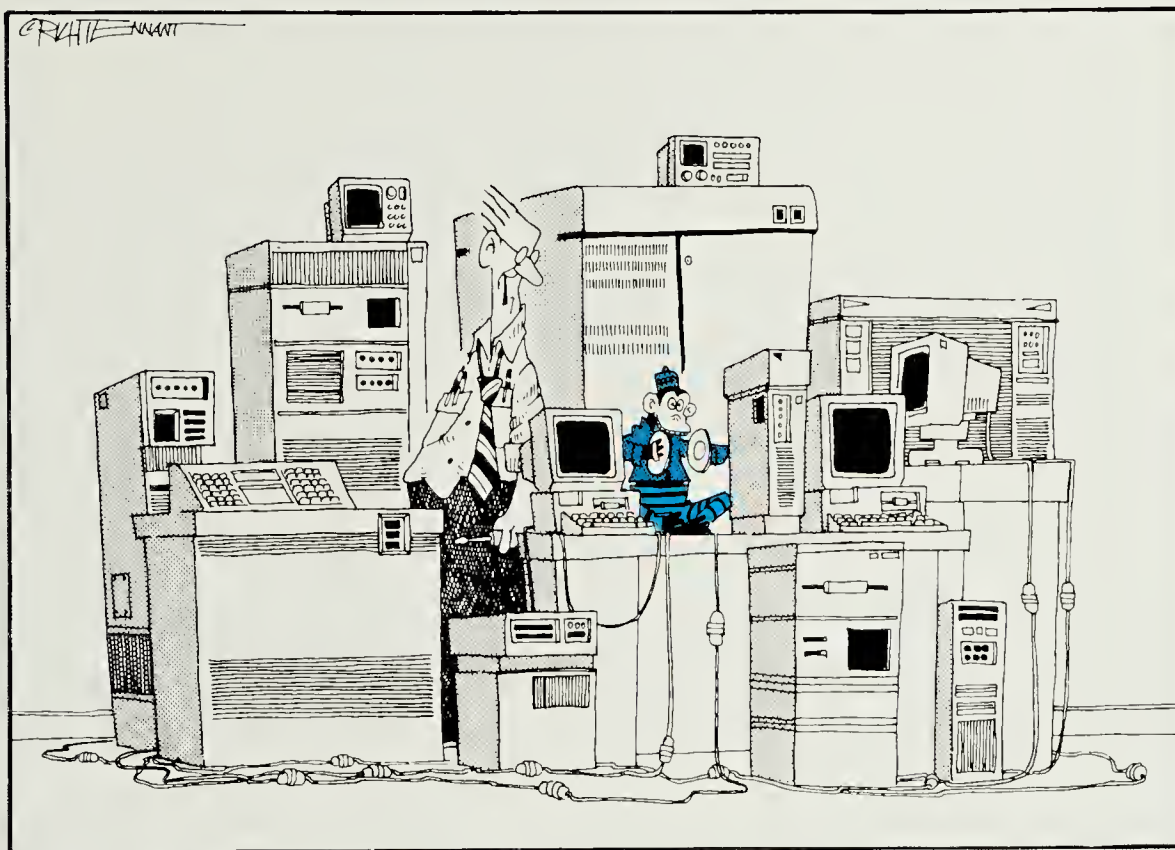
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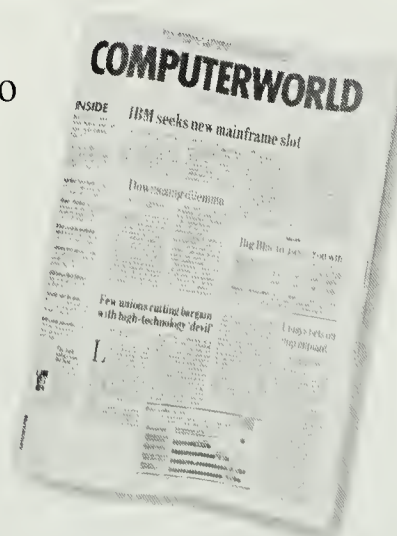
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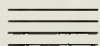
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EDITOR'S NOTE



A new school of thought

Harvard Business School grads don't go into information technology as a career. So says Warren McFarlan, a noted information technology guru who happens to teach there. Often saddled with \$65,000 in debt after completing two years at the B-School, these hot properties find more lucrative callings in marketing, general management or investment banking.

Let's call a turnip a turnip. Harvard or Stanford or Chicago grads look down on careers in information systems. Despite all they've heard and seen, they still believe IS is for techies. That is sad and a bit ironic, because these CEO wanna-bes are missing a critical point: Technology has already changed, quite dramatically, the way corporations do business. The next generation of business talent will have to be heavily steeped in technology, or it will fail.

Proponents of MBA programs designed to create general managers argue that they include courses on IS in their curricula so that graduates have a good grasp of the importance of technology. But only a couple of years ago, places such as Stanford and Harvard offered just one or two courses in technology within their graduate programs, and there is little evidence that much has changed lately. One or two courses do not a guru make.

All of which leaves a very interesting opportunity for all of you technol-

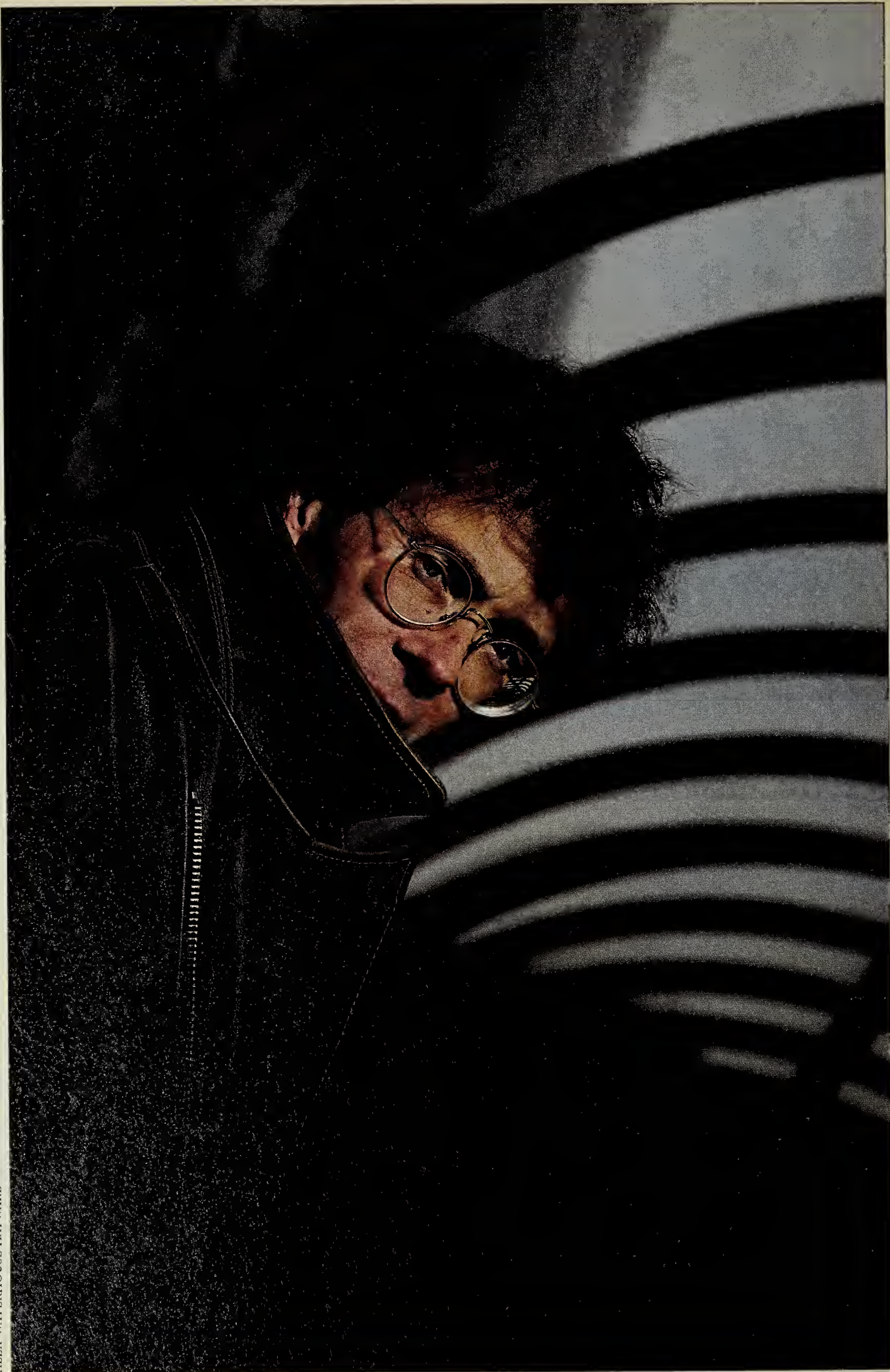
ogy types who want to find rewarding jobs with clout. A solid grounding in business and technology is quickly becoming a ticket to a fast ride up the corporate ladder, even though the chief executive officer suite remains an elusive destination.

The business landscape has seemingly changed overnight, and firms face challenges that were heretofore just concepts in journals. The 1990s corporation must search out where technology can be leveraged to create market strength and must have the people inside who can implement it.

It isn't enough to just know the technology buzzwords. A true grounding in the implementation of technology can only be achieved by getting down and dirty in the trenches. You may not have to be a programmer/analyst, but your understanding of networks, communications and systems could make you an invaluable resource for marrying business applications with strategic technology.

Now the Harvard grads will take up this challenge and point out that CEOs don't come from IS. And you can snort and grumble. Or you can simply smile and say, "Not yet."

ALEX WATERHOUSE-HAYWARD



CYBER SPACE '90

***Neuromancer* author William Gibson explores the final frontier**

I was born in 1948 in the Late Dawn period of the Information Age. I knew environments in which there was no television. My childhood was strongly colored by rampant technological optimism and a concomitant undertone of abiding dread. The two poles of the mass imagination were a glittering futuropolis, slick as Johnson's wax, and the shadows of the nuclear wasteland. I was constantly told by various authorities that the Atom would Change Everything. (Somewhat later, if less officially, I was told the same thing about LSD.)

I saw the world, then, much as I see it now — as the ultimate science fiction scenario. But the science fiction I grew up with was about technology as its makers would have had us receive it. The future would arrive on a stainless platter, probably of Scandinavian design, to be in-

stantly and obediently taken up by Americans of my generation — to be, it went without saying, applied to the purpose for which its manufacturers had intended it.

The science fiction I grew up with was seldom about garbage. Nor was it often about the messy and fascinating uses the human animal finds for the things that arrive daily from the uncounted factories of a world that sometimes fancies itself postindustrial. But the stainless platter is gone, replaced by a stream of cardboard-backed bubble packs. There is no particular end in sight and The Street, home to that messy human animal, persists in finding its own uses for things. (We have it on reliable authority that Colombia's coke barons employ expert systems to route the global flood of their product. . .)

My own science fiction has tended to be about garbage, the re-

fuse of industrial society. We swim (and sometimes sink), after all, in a sea of the stuff. We also swim, some of us, in largely uncharted seas of information, sustaining the very monsters of my bread and butter: the Outlaw Hacker and the Great Big Corporation. When I wrote *Neuromancer* in 1983, "hacker" had not yet acquired its current freight of negative value. Hackers were obsessive, super-bright boffins who delighted in worming their way as far into the texture of the emerging data matrix as possible; they were sometimes, in fact, the very same techie folk heroes who brainstormed the personal computer into being, some few of them even managing to become Great (or at least Pretty) Big Corporations in the process. To hack, in the original sense, was not bad; to hack was to *be there*.

Be where? Cyberspace. Not the neural-jacked fantasy purveyed in

those paperbacks of mine. Rather, in the altogether more crucial version of the concept as currently championed by John Perry Barlow, Mitch Kapor and the Electronic Frontier Foundation: the totality of information existing in the matrix *right now*. Because cyberspace, as I've been muttering for years, is already here. Or rather, we are already there and have been for some time.

This is difficult for some of us to see, likely because we're more used to technologies that open pre-existing territories. Cyberspace, in Barlow's sense, is a territory *generated* by technology. As such, the "territory" itself is subject to constant growth and permutation — a cybernetic Wyoming writhing in some eerie interstice between concept and silicon. Yet real, surely, because we can be roused by the Secret Service for crimes alleged to have been committed there.

And now, teetering on the brink of a new world order/chaos theory, apparently having arrived just in time to describe the global political situation, we are told that Virtual Reality technology is about to Change Everything. The video helmets and data gloves of VR are our current hot tickets to the future.

But the future has junkyards, where one day even the hottest machines must be left out in the rain to rust. All technology eventually gathers dust. What matters is territory, and in its generation of territory, the advanced technology of information is unique. The territory is there, awaiting partition. Fascinating as the potentials of

Cyberspace is a territory generated by technology subject to constant growth and permutation — a cybernetic Wyoming writhing in some eerie inter- stice between concept and silicon.

VR may be, I'm more impressed by the Kaporian metaphor of the electronic frontier.

Cyberspace, today, seems just that — a virtual frontier sparsely inhabited by technical pioneers: loners, visionaries and even outlaws, all of them willing to live off the land. Both the hacker and the corporation (let us include governments and military entities) have been aware of the territory, in some sense, from the beginning — the hacker, by nature of his being, and the corporation, by virtue of its need to define itself.

The first hackers were, in many instances and quite literally, creators of the territory they explored; as such, they were necessarily possessed of a certain edge. But the railroad is no doubt on its way in the form of the Great Big Corporation, and

with it will come what my colleague Bruce Sterling has called the Planned Development of Hyperreal Estate. The proto-hackers of the 1970s may one day be remembered as cybernetic mountain men, the earliest settlers in a landscape long since dominated by data malls and information megamarts.

Or perhaps I'm merely being romantic; perhaps the mall, the dominant structure of our economy, is already firmly in place. In the data mall, the majority of users go about their business in the most ordinary way. Most, in fact, are as yet unaware of the mall itself and see only their own specific destinations and the functions they must perform there. Amid these good and ordinary folk of Cyberia, however, there may sometimes be found exceptions: spies, vandals, voyeurs, terrorists, artists and combinations thereof. But these others have one thing in common, if nothing else: They are aware that there *is* a mall. (Though our data mall currently differs from the concrete and glass model in one minor, but perhaps crucial, specific: Scattered amid the chain stores and fast food franchises are meeting places of an almost European intimacy — nonprofit hangouts of hair-down boho splendor. These are bulletin boards, and our "other users" are prone to spend a good bit of time there.)

Myself, I'll stick with garbage, because my real business has less to do with predicting technological change than making evident its excesses. I'll stick with the poetry inherent in reels of magnetic wire recordings, rusting under a sun-faded card table at a California swap meet. We may not actually recall the machines required to summon voices from these brittle yards of steel, but there's an appealing melancholy in the fact that the vendor is unaware that these *are* recordings. All those voices. Other days, other days.

And one day our floppies will lie there by the millions, warping and gathering dust, not to mention that svelte laptop you've just decided on.

Meanwhile, I'd advise those of you so inclined to definitely go West. It's either El Dorado or a shopping mall — same as it ever was, somehow.

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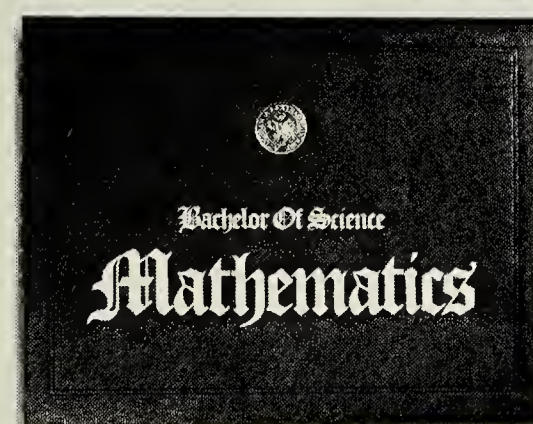
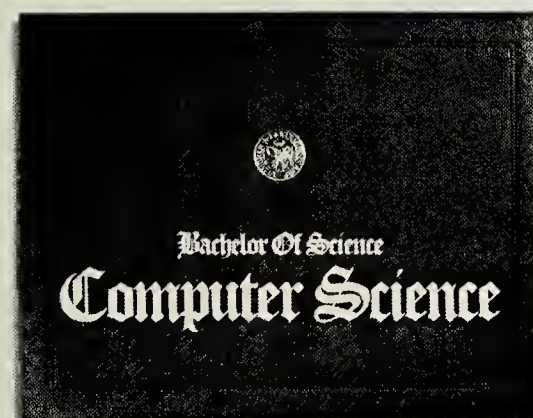
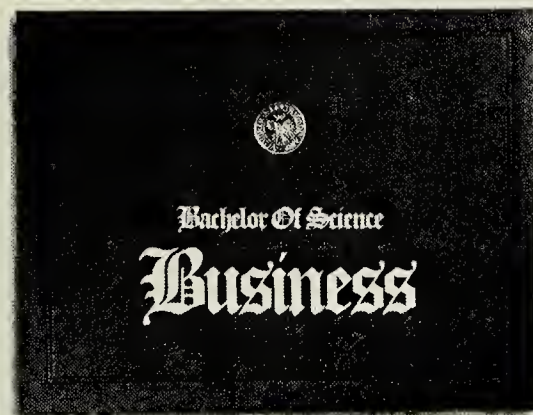
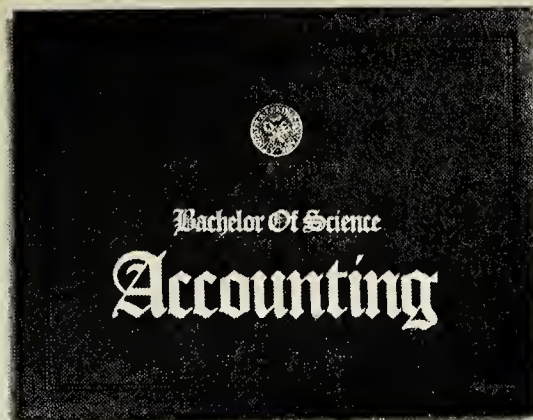
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Gibson is the author of *Neuromancer* and winner of the Hugo and Nebula Awards for science-fiction writing.



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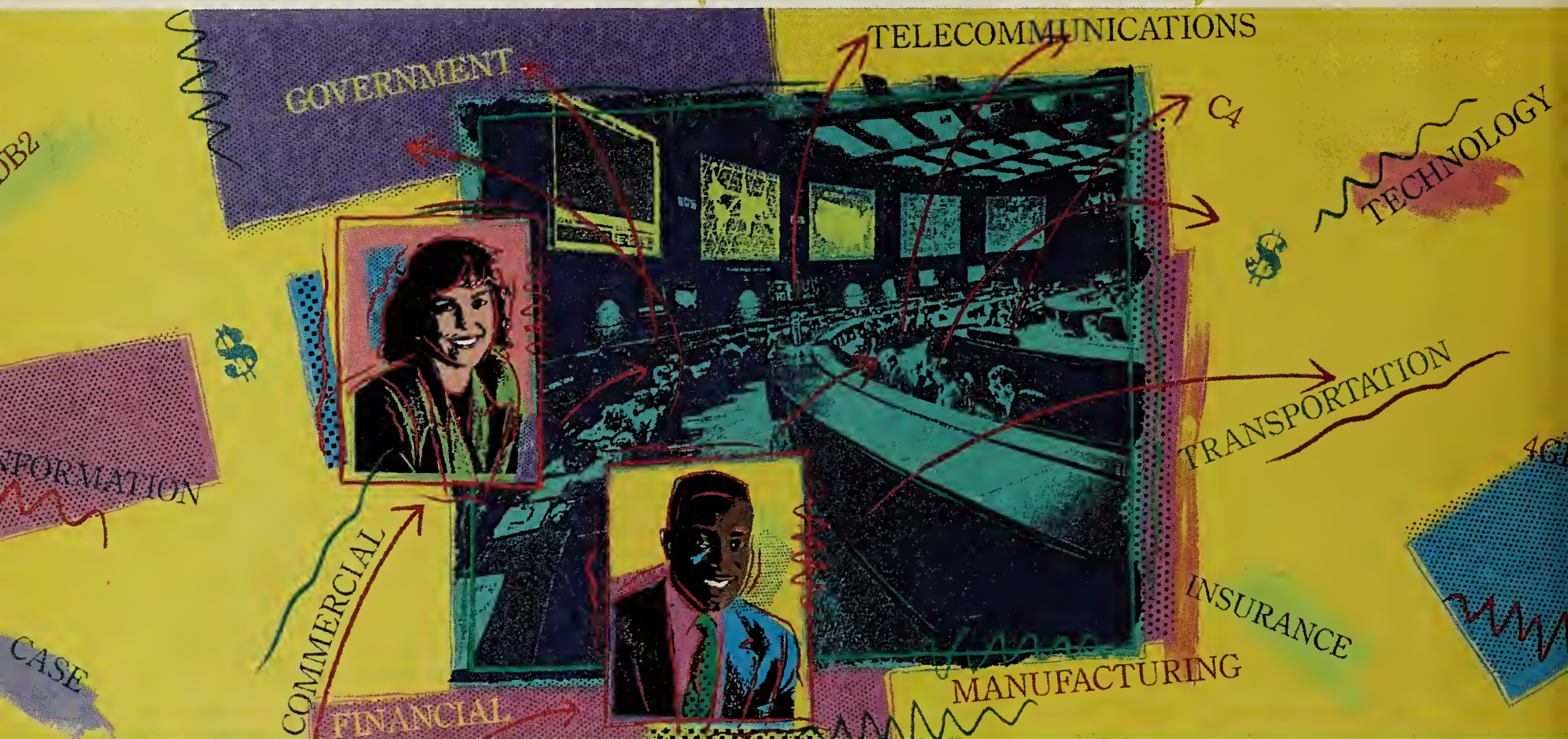
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- | | | |
|----------|-------|----------------------|
| 1) _____ | _____ | A. MIS |
| 2) _____ | _____ | B. Engineering |
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|---|---|
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| <input type="checkbox"/> Computer Science | <input type="checkbox"/> Computer Science |
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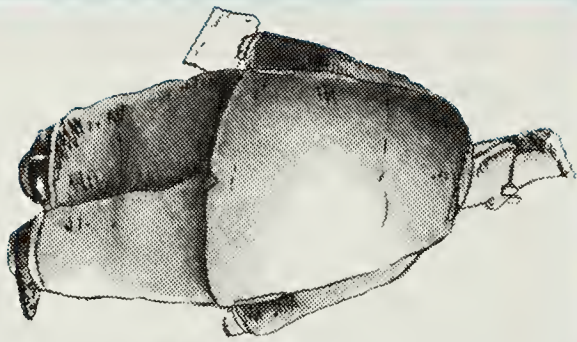
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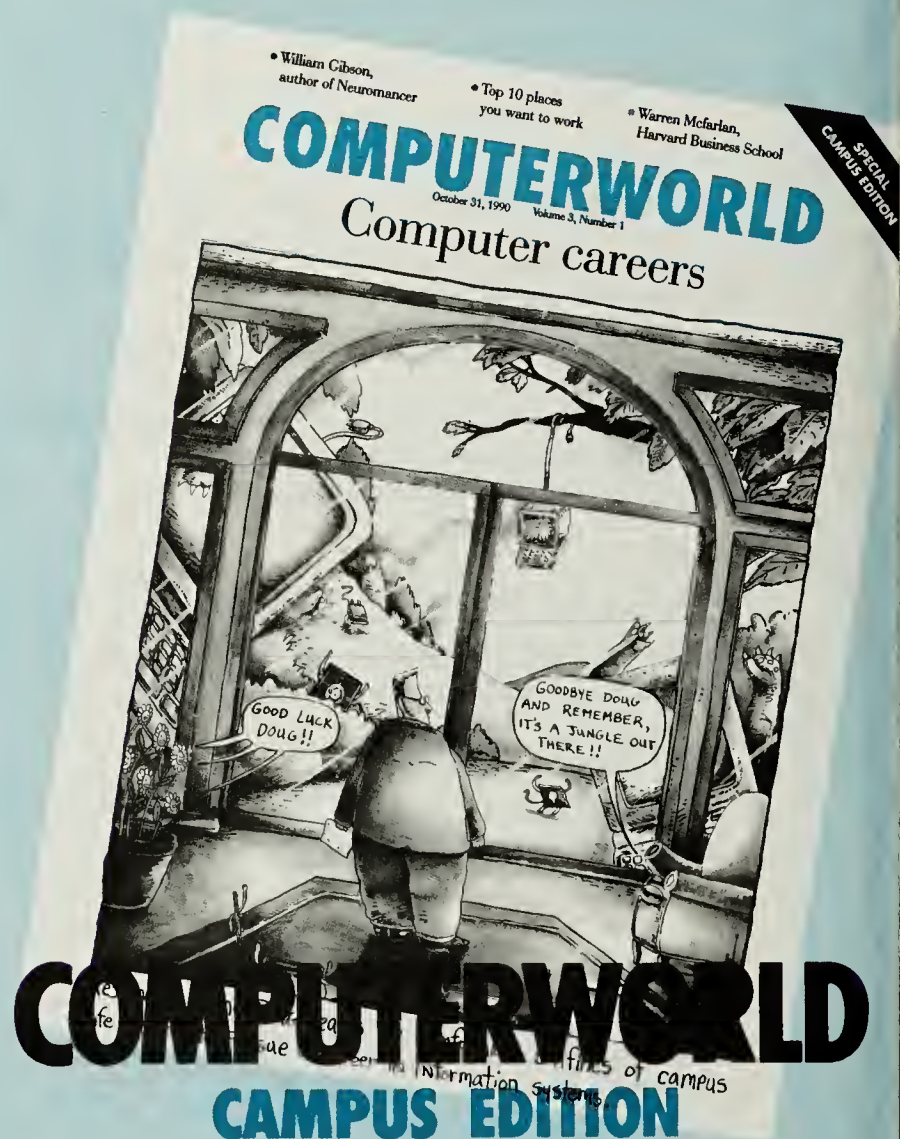
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DREAM JOBS

Where you want to work, and why

By Sheryl Kay

If you had your druthers, where would you like to work? *Computerworld* posed that question to 800 students in information systems, computer science and electrical engineering programs around the country and came up with a list of the Top 10 companies. Traits the students looked for among potential

into the Top 20.

Hal Sullivan, president of the systems recruiting firm Linn-Truett, Inc. in San Antonio, Texas, believes this may be largely because of name recognition. "They see advertisements in journals; they are staring at hardware and software with these companies' names all

Big Blue as their top choice.

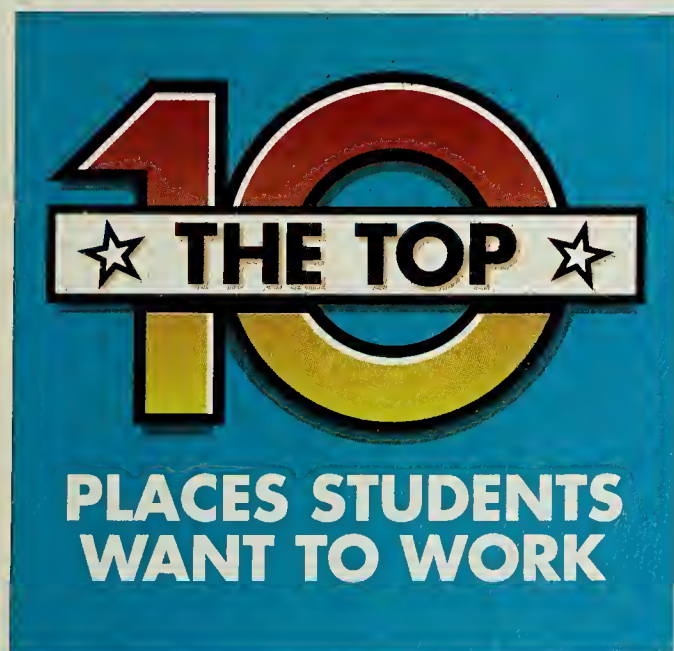
"IBM is the pacesetter," explains Angel Mays, who is currently working toward a bachelor's degree in computer science at Franklin University in Columbus, Ohio. "When it takes the lead, everyone else follows," she says.

While IBM will hire fewer college students than usual in 1990 to maintain its policy of no layoffs, college recruiting will be back up in 1991, according to Lee Covert, manager of IBM's national recruiting organization based in Purchase, N.Y.

The company is looking for hires with bachelor's degrees in computer science, electrical engineering, mathematics, accounting

and business.

"Students coming to work for us will work with leading-edge technology, in small teams and with a diversity of assignments," Covert says. For Mays, that job description sounds just right: "I love making that bucket of bolts do what I want it to do."



1. IBM	497
2. AT&T	342
3. Hewlett Packard	191
4. DEC	134
5. Apple	101
6. General Electric	95
7. Motorola	85
8. Arthur Andersen/ Andersen Consulting	65
9. Microsoft	64
10. Intel	51

Total responding: 772

(Students were asked for their top five choices; the list reflects the total number of mentions of each company.)

Source: *Computerworld*

employers included opportunities for further education and training, a global corporate outlook and meaningful responsibilities.

Interestingly, all of the Top 10 companies are in some way involved directly with the business of technology. No banks, insurance firms or retail companies even made it

over everything," Sullivan says. Students are constantly being bombarded with information about these companies and their reputations while in school.

Here are profiles of the Top 10:

#1: IBM

Well over half the students listed

STUDENT PROFILES



George E. Klimes

Age: 26

► **B.S., biology, computer science minor, Georgetown U., Washington, D.C. Working on master's, computer science, George Mason U., Fairfax, Va.**

► **"I'll be teaching Intro to computer science this fall at Georgetown, but I also have a part-time computer consulting business."**



Richard Pyra

Age: 26

► **B.A., computer science and math, Rhodes College, Memphis. Working on MBA, finance and IS, University of Rochester School of Bus. Admin., N.Y.**

► **"My goal is to secure a partnership with a consulting firm or become a divisional manager with a technology firm or group."**

#2: AT&T

"I'd like to help them come up with newer and better telecommunications hardware," says Raymond Papp of Farmington, Conn., describing what he would do if offered a job by AT&T.

While working toward his master's in business management at Central Connecticut State University last year, Papp wrote a paper on AT&T's signaling system. "I found AT&T to be an international pioneer in the field," he states.

Recent graduates are attracted to AT&T because of its worldwide product and services reputation, says Gale Varma, manager of corporate college recruiting for AT&T in Morristown, N.J.

"We are a global company with projects of international scope, and global is in with the students today," she says.

Varma forecasts approximately 2,000 new college graduate hires in 1991, with an even mix of undergraduate and advanced degrees who will work as software developers and systems engineers. Most college recruiting is done on campus; however, Varma says, her office receives more than 200,000 inquiries per year.

#3: Hewlett-Packard Co.

Students who seek a team-oriented environment yet desire an opportunity to express their individual creativity would feel right at home with HP, says Kathy Burke, the company's national college relations and recruiting manager in Palo Alto, Calif.

Burke estimates that in 1991 HP will hire 600 college students with degrees in computer science, electrical engineering, mechanical engineering, industrial engineering and business administration.

According to Burke, HP has a unique, informal management style as well as a commitment to the community in which it resides.

For Eli Robinson, a first-year MBA student at the University of Vermont, that HP philosophy is in line with his future goals. Robinson, who is interested in sales, says he would like to work for "a company that puts out quality products because I'll be selling directly to the end user, and it's important to represent something that won't come back to haunt me."

Through conversations he has had with acquaintances who work for HP, Robinson has learned that HP projects are worked on by small groups of people — something he finds attractive.

#4: Digital Equipment Corp.

DEC's presence on campus leaves a lasting impression, according to Deann Sklenak, personnel consultant in DEC's college program office in Maynard, Mass.

"Many students have worked extensively on our VAXs at school," Sklenak says. Such experience tends to influence students to look to DEC upon graduation, she adds.

Alec Berenbaum agrees. Having worked with DEC equipment and service personnel, Berenbaum,

who is currently pursuing an M.S. in computer science at Rochester Institute of Technology in New York, gained respect for the firm as one of the leaders in networking. It's one of his top choices for employment.

As with many companies in the Top 10, DEC offers staff career paths in technology or management. Sklenak emphasizes that the two ladders parallel each other; in fact, employees may go back and forth between the two as well as change divisions.

#5: Apple Computer, Inc.

Headquartered in sunny Cupertino, Calif., the "Apple campus" is described as casual and laid back, "an easy transition from college," says Apple college relations staffing specialist Ron Jennings.

Rob Sabey, of Rock Hill, S.C., learned from friends who were interns at Apple that new hires were given project responsibility from day one.

"If the opportunity were right," says Sabey, who just completed his MBA at Brigham Young University in Provo, Utah, "I'd want to work with [Macintosh] networks in corporate MIS."

"Mac programming is highly sought after," Jennings notes; however, he says, it "is not necessarily more important than a good mainframe background." Many students who are ultimately hired at Apple have gone through a summer internship with the company, he adds.

Jennings also stresses that students will find Apple to be strongly committed to diversity in the workforce. Women and minorities will feel very much at home there, he says.

#6: General Electric Co.

Noting that the number of individuals entering IS programs may be shrinking, Randy Johnson, manager of GE's IS management program in Bridgeport, Conn., says it's important that students "regard us as one of the best."

For Dahong "David" Qian, working for the company he considers the best is a major reason he'd like to work for GE. Now working toward a master's degree in mechanical engineering at the University of Texas at Austin, Qian's knowledge of GE comes mainly from his uncle, who is currently employed as a chemical engineer at GE in Albany, N.Y.

"He described it as an exciting place to work, where you are teamed up with senior employees, so you learn a lot. He says you are given the chance to achieve personal ambitions," Qian explains.

In fact, training is one of GE's major drawing cards, Johnson says. Through a combination of classroom and on-the-job training, new hires are able to continue to develop the skills that they learned in school.

In 1991, Johnson anticipates that GE will hire approximately 80 students for the IS management program, the majority of whom will have bachelor's

Continued on page 12



Computer science major Cary Cannova made an intelligent choice when he joined Amoco. **B**ecause right out of school, he's involved with a cutting-edge information management system that's changing the way we do business. **T**he project is EPICS (Electronic Processing of Information, Cash and Sales), and it's taking our 3,500 service stations from a paper environment to a fully electronic network. **O**ne smart enough to automatically record sales, monitor inventory, activate pumps, even

access an expert "help" desk. **E**PICS gives Cary a programming challenge that integrates all aspects of the company, from Accounting to Marketing and Sales. **I**t also connects him to every community where Amoco retails. **B**ecause EPICS can flag underground tank leakage. **I**t's the safest detection system yet. **I**f you want to work not just with data but with important human considerations, choose Amoco, and help make the world a more intelligent place.

**"I'm helping create a
network of stations as
intelligent as this one."**



Amoco Corporation
Choose the big business that makes a big difference.



Continued from page 10

degrees in computer science, business or math. The Edison engineering management program in Bridgeport, which requires students to have a degree in electrical or mechanical engineering, will have at least as many openings for grads.

#7: Motorola, Inc.

Anna Dorfman, a recent graduate of the University of Illinois in Chicago, now works for Motorola as a programmer/analyst in the company's Manufacturing Business Systems Division. For her, Motorola's educational opportunities and international status were important.

Tuition reimbursement was high on Dorfman's list in finding an employer. "I want my master's degree, and Motorola offers 100% paid tuition," she says.

In addition to training, Motorola gets student hires involved in a meaningful project right from the start, says Tunnice Glass, manager of professional and technical recruiting at Motorola's headquarters in Schaumburg, Ill. "We offer a variety of work assignments, from semiconductors to general business systems to cellular telephone pagers," Glass says.

The firm's global nature also grabbed Dorfman's interest. "With different operations around the world, I would have the ability to move around," she observes.

#8: Arthur Andersen & Co./Andersen Consulting

Continued training is what Alan Yong was looking for in a new employer. It is also what this May 1990 graduate with a bachelor's degree in business administration in

MIS from the University of Oklahoma had in mind when he put Andersen Consulting on the top of his list.

"A good friend of mine working there, as well as a recruiter who came to our campus, described Andersen's training program as being the best in the business," Yong says.

Through its worldwide education center based in St. Charles, Ill., Andersen Consulting provides each employee with training, according to Mike Noling, the company's managing partner of operations support in Los Angeles.

Furthermore, new hires get responsibilities from the beginning. With Andersen Consulting's systems integration focus, individual staff members are involved in a variety of assignments. "Consulting," Yong says, "would provide me with the challenge of solving a variety of systems problems, while enabling me to keep current on what's happening in the field today."

#9: Microsoft Corp.

Victor Gurule of San Louis, Colo., pinpoints Microsoft as a "computer science-type company" and as a place he'd like to work.

"I've heard it's a very laid-back technical environment, where you get thrown right into a project, and it's easy for bright computer engineers to advance," says the May 1990 computer science graduate from the University of Colorado.

"Each new student hire does have a tremendous amount of responsibility from day one," says Julie Walker, senior technical recruiting manager at Microsoft. "New

employees can make an impact right up front, knowing that the product they've worked on will reach a market of millions of people," she says.

Microsoft's Redmond, Wash., headquarters is a relaxed setting that includes fountains and gardens. Employees are offered extremely flexible work hours, and there is no dress code.

If he were hired, Gurule says, he would want to work either on a Windows or operating system project at Microsoft.

Promotion at the company is based on performance, Walker says, and employees can take a management or technical track.

#10: Intel Corp.

The ability to blaze your own trail, says John Moore, program coordinator for corporate college recruitment at Intel, is luring many students to Intel. "Supervisors may watch what you do, but you're given the opportunity to succeed, rather than looked upon as taking a risk to fail," he says.

Students are put to work on "very live projects," sometimes in the first week of employment, Moore adds.

For Suber Patel, who is working on a master's degree in electrical engineering at the University of Wisconsin, attending an Intel open house brought that point home. He listened to speaker Ming Ling, who had graduated from the university a year before. "He was already one of the main product design engineers for the I860 chip," Patel observes.

Moore estimates that Intel will look to hire approximately 400 students in 1991, half with undergraduate degrees and the rest with master's degrees and Ph.Ds. Moore will be looking for graduates who have specialized in any of several disciplines, including electrical engineering, computer science, material science, chemical engineering, physics, finance and accounting.

Once Patel completes his master's degree in electrical engineering, he plans to begin studies toward his MBA. "I'd like to be in one of Intel's technical groups, such as the VLSI group, but I'm also interested in marketing. An MBA will come in handy," he explains. ◀

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

SENIORS

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JULIA TALCOTT

INTERNSHIPS:

If you're an information systems student waiting in line to register for next semester's courses, you may want to consider signing up for an internship to supplement your classroom learning. Some of you may not have a choice; internships are required in many IS programs.

"School is great for a surface knowledge of IS, but to know what you're actually going to do when you get out there, you need an internship," says Cheryl Smith, a senior MIS and marketing student at New York University. Smith spent last summer doing an internship at Citicorp in New York in the international division of the bank's Consumer Services Group. She worked with the design and development group, which was developing an international network to link all of Ci-

How they can work for you

By Kelly E. Dwyer

ticorp's different services together outside of the U.S.

Smith joined the company at the beginning of the project and was heavily involved in the documentation process, which required her to address user needs and prototype interfaces.

"I can't believe how much I learned," she says. "When I came back to school, it gave my classes so much more meaning."

Besides taking their experience back to the classroom, many students use it to help them get permanent jobs when they graduate.

"My internship made the transition into the 'real' world easier," says Meera Panchal, who now works as a project manager at Bose Corp. in Framingham, Mass. Panchal's relationship with Bose, a maker of loudspeakers and electronics equipment, began with a project team she worked on while obtaining her MIS-oriented MBA from Boston University in 1986. "It was a way to show potential employers that I wasn't shut off from

the real world for a year and helped convince them that I could do it."

Advocates of IS internship programs claim that internships help students learn what the working environment is like and give them a broader perspective than their academic curriculum provides.

"The internship experience is at least as great as any class you can take," says Steve Shankman, a University of Arizona MBA student who completed an internship at American Express Co. in its performance engineering and human resources department. Shankman's responsibilities ranged from helping people put together form letters to writing a program to tabulate the responses from an ongoing attitude/opinion survey that employees complete to measure the quality of the work environment.

"I was more of a consultant than anything else," he says. "I created databases and consulted with users who were having problems."

Eric Birchfield at the University of Texas at Austin had a similar experience at Coopers & Lybrand in Dallas. "I saw it as a chance to check out the consulting environment," he says. As a result of his experi-

ence, Birchfield says he understands systems analysis and design better. In one project that he worked on, "no one knew how to run a product, how to use it or what it could do. I learned it, trained some staff [members] on how to use it and gave a presentation to upper management about what the product did and was capable of doing."

Besides learning from his experience, Birchfield says he was able to contribute rather than just feeling like an extra body.

A REAL JOB

Internships are also valuable from the perspective of those who oversee such programs. "It's my job to make sure that the internships are true work experiences, not just summer jobs," says Domenick Cama, a technical associate program manager at Citicorp's New York technology office. "The students work with all different hardware and also do a lot of different analytical work."

Cama says the number of internships at Citicorp has been steadily increasing during the past couple of years, a trend he says he feels is a measure of the success of internship programs. He also attributes the

increase to the high quality of education many interns now receive on campus, where state-of-the-art equipment is finding its way (see story page 43).

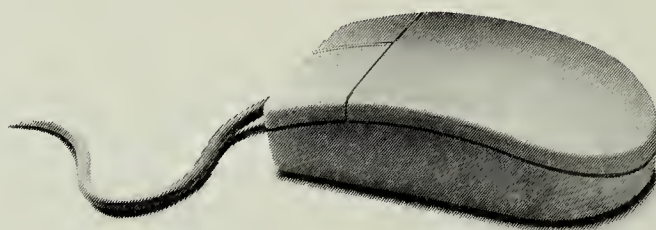
"It's educationally important for students to be able to practice the skills they've used in class," adds Jack Baroudi, associate professor at the Stern School of Business at NYU. "It's not as easy in the real world as it is in the classroom."

Internships often lead directly to jobs. Citicorp hires close to 50% of the students who start as interns.

AT&T also hires interns with the intention of offering them full-time positions when they graduate. "It really reduces our recruiting costs," says Evangeline Noble, a personnel services specialist and recruiter at AT&T's Guilford Center location in Greensboro, N.C. "If the student has a positive experience, [he passes] that along, which helps to generate business back on campus."

Besides finding out about internships on campus, some students pursue them on their own with companies they've always wanted to work for. Miro Perez, a senior at the University of Texas at Austin, targeted

We're looking for seniors who like



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Apple Computer, Inc. He sought contacts through the school's placement office but got in touch with them on his own. He was offered two internships at the firm after interviewing with Apple representatives.

Perez chose a job in the development and technology department at Apple's Integrated Systems Division because he thought the area was at the leading edge of technology. His duties included developing a database program and working on mainframe-to-Macintosh connections.

He was also involved in a database project prototype, which Apple says it is planning to implement soon. "I can tell future employers, 'I did this and it's being implemented,' " he says. "That's a real plus."

Internships may indeed be the single most important item on a resume. "The company wins because it gets good help for the summer, and the students win," says Jeff Hoffer, chairman of the IS department at Indiana University. "We win because it's good for our program." ◀

Dwyer is a former *Computerworld* intern who now works as a CW copy editor.

Experiencing your ideal internship



eterans offer these tips for landing a great internship and making the most of it:

- Don't stick to just one source in searching for an internship. Check your school's IS department, career placement office and job postings. Also, ask professors and friends if they know of any opportunities.
- Meet company representatives personally if they visit your campus.
- Look for something in your specific area of interest. Employers will want to know that your internship was more than a way to earn summer money.
- Keep trying! The perfect opportunity may not fall into your lap.
- Study hard. Know your field well enough to work on projects that will tangibly benefit your employer.
- Look for a mentor. Pairing up with a permanent employee is a great way to learn.
- Don't be discouraged or intimidated by new problems. Supervisors understand that you are there to learn.
- Seek monthly reviews with your supervisor. If your only review is at the end of your internship, you will not have any opportunity to correct your mistakes.
- Get to know as many people as possible. Your internship can provide you with valuable contacts for the future.
- Be aggressive! Go beyond your assigned responsibilities. "You have the latitude," one former intern says, "to do some things people in the company can't because they are bogged down in the details of their work."

DEREK SLATER, *COMPUTERWORLD* INTERN

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The long, hard climb

Career paths of 10 high-level IS executives

By George Harrar

In the mid-1960s, Michael Simmons was a biology teacher at Arsenal Technical High School in Indianapolis. Now, at age 50, he is executive vice-president of technology and operations at Bank of Boston, the head of a 2,000-member organization.

Charles Carlson, who in 1954 received a bachelor of arts degree in English literature from the College of St. Thomas in St. Paul, Minn., today oversees the delivery of information processing and voice/data communications to the business units of retailer Sears, Roebuck and Co.

Rick Adam graduated from West Point in 1968 and headed into

the Air Force for five years. Five jobs later, he presides over the global operations and information technology department at financial company Goldman, Sachs & Co.

The profession now known as information systems barely existed 30 to 40 years ago when many of today's chief information officers left college looking for work. Without any role models to follow — or long-term plans in their heads — they set off in the various directions that ended up inside the CIO's office.

Carlson, for instance, started at Sears as a part-time salesman during high school in 1948 and has been

there ever since. He was working on his doctorate in English literature with plans to be a professor, "but I was offered the opportunity to be a department manager at Sears, and the pay was \$5,400 a year. A friend of mine had just gotten a Ph.D. at Harvard and was getting paid \$5,000 to teach at the University of Iowa." Based on the money, he says, he decided to stay at Sears instead of teaching.

In 1965, Carlson was sent as the representative of store operations into the systems department, where, as he remembers it, the first fully automatic point-of-sale system was being developed. Living and breathing



Charles Carlson
VP, tech services
Sears, Roebuck



Rick Adam
CIO and partner
Goldman, Sachs



Susan Mersereau
VP, general manager
Weyerhaeuser



John Ullrick
VP and director, MIS
Playboy Enterprises

data processing led Carlson to move officially into that area in 1969 as manager of the Louisville Retail Systems Research Center.

Unlike Carlson, Adam chose to use one company as a springboard to opportunity in another. He left the military with an engineering degree and gained a reputation as an IS turnaround specialist, moving from FMC Corp. to Litton Industries, Inc. to Baxter Healthcare Corp. When Goldman Sachs management needed to overhaul a moribund systems department, they sought Adam out.

LESSONS LEARNED

Drawing lessons from people at the pinnacle of their careers in 1990 and applying them to today's college graduates can be tough. As IS has matured as a profession, many more options have become available, such as getting a bachelor of science degree in computer science and an MBA in IS or specializing in a nonmainstream technology such as imaging, supercomputing or neural networking.

Yet the impressive resumes of 10 top IS chiefs (beginning on page 18) do reveal some lessons for those whose *curricula vitae* is long on education and short on work experience:

- Liberal arts graduates should not feel that they are necessarily overmatched by job candidates carrying technical degrees.
- The fastest movers in the field are the people who grab every opportunity for advancement, whether it fits in with their career plan or not.
- As vendors continue to build equipment and create software that

functions better, companies will need fewer people with technical skills and more people with the business sense to put the technology to use.

- Working for a vendor firm soon after school can provide valuable insights into technology and important job connections for the person wanting to work at a user firm.

Susan Mersereau, the vice-president and general manager of Weyerhaeuser Information Systems, began her work life as a high school history teacher. She comes from a strong liberal arts background, and when she talks of her interest in languages, she means German, not Cobol and C.

"My education encouraged me to focus on the interrelationships of any problem we were considering," Mersereau says. "I studied history in the context of economics, finances, world affairs, art and culture. In IS today, the biggest challenge is not only to understand the technology as it is evolving but also how it fits with the whole construct of the organization. I'm always trying to integrate the pieces that aren't naturally linked."

People who want to stay on a technical track throughout their careers should probably begin that focus on technology in college, Mersereau says.

However, "if they want to go into the business side of things, then they must learn how to identify what the business problems are and how to apply the technological solutions," she adds.

Mersereau says she feels she ended up in a career that suits her mind-set. She prefers a field such as

information technology in which there is often no right or wrong answer — it's how you put the pieces together to solve a problem.

Although she has become the first female to oversee an operating division at Weyerhaeuser, a Seattle-based wood products company, Mersereau still continues her education. This year, she completed her second master's degree, this one in organizational change at Antioch College in Yellow Springs, Ohio.

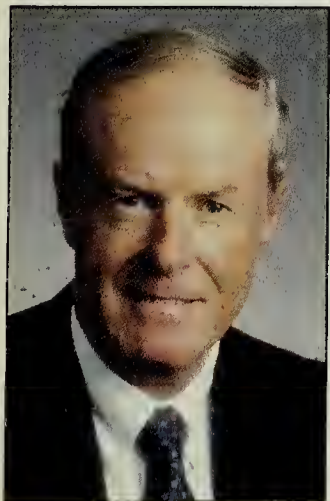
NONTECHNICAL BACKGROUND

John Ullrick, vice-president of MIS at Playboy Enterprises, Inc., studied marketing in college and began his work life as an accounting trainee at U.S. Steel Co. He was promoted to an administrative position in an unfamiliar area — computer operations.

"It was somewhat overwhelming," Ullrick says, "because I didn't even know what a computer was." The technical people working for him needed little guidance, giving Ullrick the chance to slowly learn the complexity that goes along with computer operations.

Today, he shies away from applicants to his staff with unusually strong technical backgrounds, unless they have minored in finance or business. "Our stated business plan is one of growth and acquisition," Ullrick says, and therefore, "I always hire the strong business person because you can teach him the technical side pretty quickly, as long as he has the mind for it. It's much harder to teach a technical person the business

Continued on page 20



James Sutter
VP, general manager
Rockwell International



CINDY CHARLES

Carlene Ellis
VP, administration
Intel



STEVE SAXTON/GAMMA LIAISON

Max Hopper
Senior VP, IS
American Airlines



James Marston
Senior VP and CIO
American President

CHARLES A. CARLSON

EXPERIENCE

1988-present

Vice-president of technology services, Sears, Roebuck and Co.; president, Sears Technology Services, Inc.

1981-1988

Vice-president, information systems and data processing, Sears, Roebuck Merchandise Group.

1980-1981

National manager of the computer and telecommunications services department, Sears.

1976-1980

Territorial manager of the data processing department, Southern Territory in Atlanta, Sears.

1969-1976

Manager, Louisville Retail Systems Research Center in the national data processing department, Sears.

1965-1969

Staff assistant, national retail operating department, Sears.

1957-1965

Management positions, Sears retail stores.

1948-1954

Part-time salesman, Minneapolis Sears retail store.

EDUCATION

Graduate work as a Woodrow Wilson fellow, University of Iowa, Iowa City, 1955-56.

B.A. in English literature, College of St. Thomas, St. Paul, Minn., 1954.

GEORGE F. (RICK) ADAM

EXPERIENCE

1987-present

Chief information officer and partner, Goldman, Sachs & Co. Responsible for the information technology department as well as Global Operations — the firm's worldwide securities, commodities and futures processing capabilities.

1980-1987

Corporate vice-president and chief information officer, Baxter Healthcare Corp. Operated the Information Systems Division and headed a new for-profit division called the Baxter Systems Division.

1978-1980

Associate director of computer systems, FMC Corp. Ran the corporate data centers, telecommunications services and systems development.

1976-1978

Director of computer systems, Litton Industries, Inc.

1973-1976

Sales representative, IBM.

1968-1973

Captain, First Lieutenant, Second Lieutenant, U.S. Air Force. Worked as computer officer and data center manager in the Apollo space program.

EDUCATION

B.S. in engineering, West Point, 1968.

SUSAN MERSEREAU

EXPERIENCE

1988-present

Vice-president and general manager, Information Systems Division, Weyerhaeuser Co.

1983-1988

Director, telecommunications, Information Systems Division, Weyerhaeuser.

1982-1983

Manager of advanced planning and technology, Information Systems Division, Weyerhaeuser.

1981-1982

Program manager, solid wood, Weyerhaeuser.

1978-1980

Director, department of planning research and evaluation, Seattle School District.

1976-1978

Director, department of management information services, Seattle School District.

1971-1976

Research positions.

1970-1971

Administrative assistant, Teacher Corps. Program, University of Illinois.

EDUCATION

M.A. in teaching history, University of Chicago, 1971.

B.A. in history, Scripps College, Claremont, Calif., 1968.

JOHN ULLRICK

EXPERIENCE

1987-present

Vice-president, MIS; director, MIS, Playboy Enterprises, Inc. Oversees staff of 20 charged with finding opportunities to use information processing to help build the company.

1984-1987

Director, MIS, The Pepper Companies

1981-1984

Manager of information systems, UOP, Inc., Signal Resco.

1973-1981

Project leader and senior systems analyst, Automotive Products Division, UOP.

1967-1973

Programmer/analyst, procedures analyst, operations supervisor, accounting supervisor and accounting trainee, U.S. Steel Corp.

EDUCATION

B.S. in marketing, University of Illinois, 1967.

JAMES F. SUTTER

EXPERIENCE

1983-present

Vice-president and general manager, Rockwell International Corp.

1980-1983

Director, corporate information management, Xerox Corp.

1975-1980

Director, corporate information systems & telecommunications, Xerox.

1974-1975

Manager, administrative business operations, Xerox.

1971-1974

Manager, international planning, Xerox.

1970-1971

Manager, systems architecture & control, Xerox.

1967-1970

Manager, manufacturing services, Xerox.

1966-1967

Manager, data processing, Iowa Beef Processors.

1961-1966

Management trainee and manager, data processing, Rexnord, Inc.

EDUCATION

MBA in finance and business administration, Marquette University, 1970.

B.S. in finance, University of Notre Dame, 1959.

CARLENE M. ELLIS

EXPERIENCE

1987-present

Vice-president, Administration Group, Intel Corp. Corporate officer since 1989.

1985-1987

Director of corporate information services, Intel.

1980-1985

Head of planning and control function in corporate information services; manager of application systems and director of marketing services, Intel.

1976-1980

Manager of information services and other information systems management positions, Fairchild Camera and Instrument Corp.

1973-1976

Assistant IS officer and other data processing positions, city of Jacksonville, Fla.

1971-1973

Applications programmer, Western Electric.

1969-1970

Engineer, Western Electric.

EDUCATION

Postgraduate work at University of Georgia and University of Alabama.

B.S. in mathematics, University of Georgia, 1969.

MAX D. HOPPER

EXPERIENCE

1985-present

Senior vice-president, information systems, American Airlines. Spearheads and supervises the systems efforts of the airline and its parent, AMR Corp.

1982-1985

Executive vice-president, Bank of America.

1980-1982

Vice-president, data processing and communications services, American Airlines.

1972-1980

Assistant vice-president, marketing automation programs, and director of Sabre reservations system, American Airlines.

1970-1972

Director, Unimatic computer systems, United Airlines.

1967-1970

Consultant on automated systems, Electronic Data Systems Corp.

1958-1967

Positions in research department, Shell Oil Co.

1953-1955

Positions in research department, Shell Oil.

EDUCATION

B.A., University of Houston, 1960.

JAMES MARSTON

EXPERIENCE

1987-present

Senior vice-president and chief information officer, American President Companies Ltd. Also president of American President Systems Ltd. Responsible for all of information systems, computers and communications for this \$2.3 billion international shipping, stack train and truck company. Oversees a staff of 450.

1986-1987

President and chief operating officer, AMR Corp. Technical Training. Directed the start-up of this major American Airlines affiliate, which provides high-technology training.

1982-1986

Vice-president, data processing and communications services, AMR.

1972-1982

Officer positions, U.S. Air Force, including assistant deputy chief of staff, data systems; director, computer applications; deputy assistant for data automation, Europe; deputy director of computer resource planning; and division chief, computer applications.

1956-1972

Operational and computer assignments.

EDUCATION

M.A. in public administration, University of Oklahoma, 1970.

B.A. in political science, University of Maryland, 1955.

ROBERT J. FETTEN

EXPERIENCE

1988-present

Director, information services, The Metropolitan Opera. Responsible for system design, programming and operations.

1980-1981

Assistant vice-president, Manufacturers Hanover Trust Corp. Was senior manager for five project leaders dealing with internal consulting and development of new technology for international funds transfer.

1976-1980

Assistant treasurer, Chemical Bank. Was senior manager overseeing four project managers.

1975-1976

Vice-president, John C. McWilliams and Associates. Consulted for a firm advising the hospital automation field.

1972-1975

Director of systems and data processing and associate director of finance, George Washington University Medical Center.

1967-1972

Director of systems and data processing, Mount Sinai Medical Center.

1965-1967

Program coordinator, Control Data Corp.

EDUCATION

B.S. in mathematics, George Washington University, 1972.

MICHAEL SIMMONS

EXPERIENCE

May 1990-present

Group executive and executive vice-president of technology and operations, Bank of Boston. Leads a restructured and centralized group of more than 2,000 employees charged with providing advanced technology and operational support to the entire corporation.

1988-1990

Executive vice-president of Bankamerica Systems Engineering. Responsible for designing and operating worldwide computer and telecommunications systems.

1984-1988

President, Fidelity Systems Co. Directed a work force of 1,100 responsible for data processing operations, software development and customer service.

1980-1984

Executive vice-president, information systems and operations, American Fletcher Bank.

1968-1980

Systems engineer, IBM. Installed equipment, wrote applications packages and provided technical help to customers.

1964-1968

Biology teacher, Arsenal Technical High School.

EDUCATION

B.S. in biology, Indiana State University, 1964.

Continued from page 17
side of things.”

If running the systems operation of a major corporation is the career goal, what is the first step? It may be working for a vendor company.

“That first job was the most fortu-

itous,” Simmons says, “because one of my accounts was American Fletcher Bank. When they needed someone to fix their DP problems in 1980, they offered me the opportunity.”

Adam was a sales representative for IBM from 1973 to 1976 and had Litton as

one of his accounts. When that company needed a new director of computer systems, it didn't have to look far.

Working for a vendor can help a young engineer not only prove his technical talents but also help hone them.

“One characteristic of computer companies,” says James Sutter, who worked for 16 years at Xerox Corp., “is that they put a lot of emphasis on training.”

Currently vice-president and general manager at Rockwell International Corp., Sutter says that if he were starting out today, he would consider a different launching pad into IS — systems integration at a place such as Arthur Andersen. “There you are thrown into a wide range of installations, helping with training and implementation. That's where you can get a firehose dose of experience. Drink from the firehose wherever you can find it,” he says.

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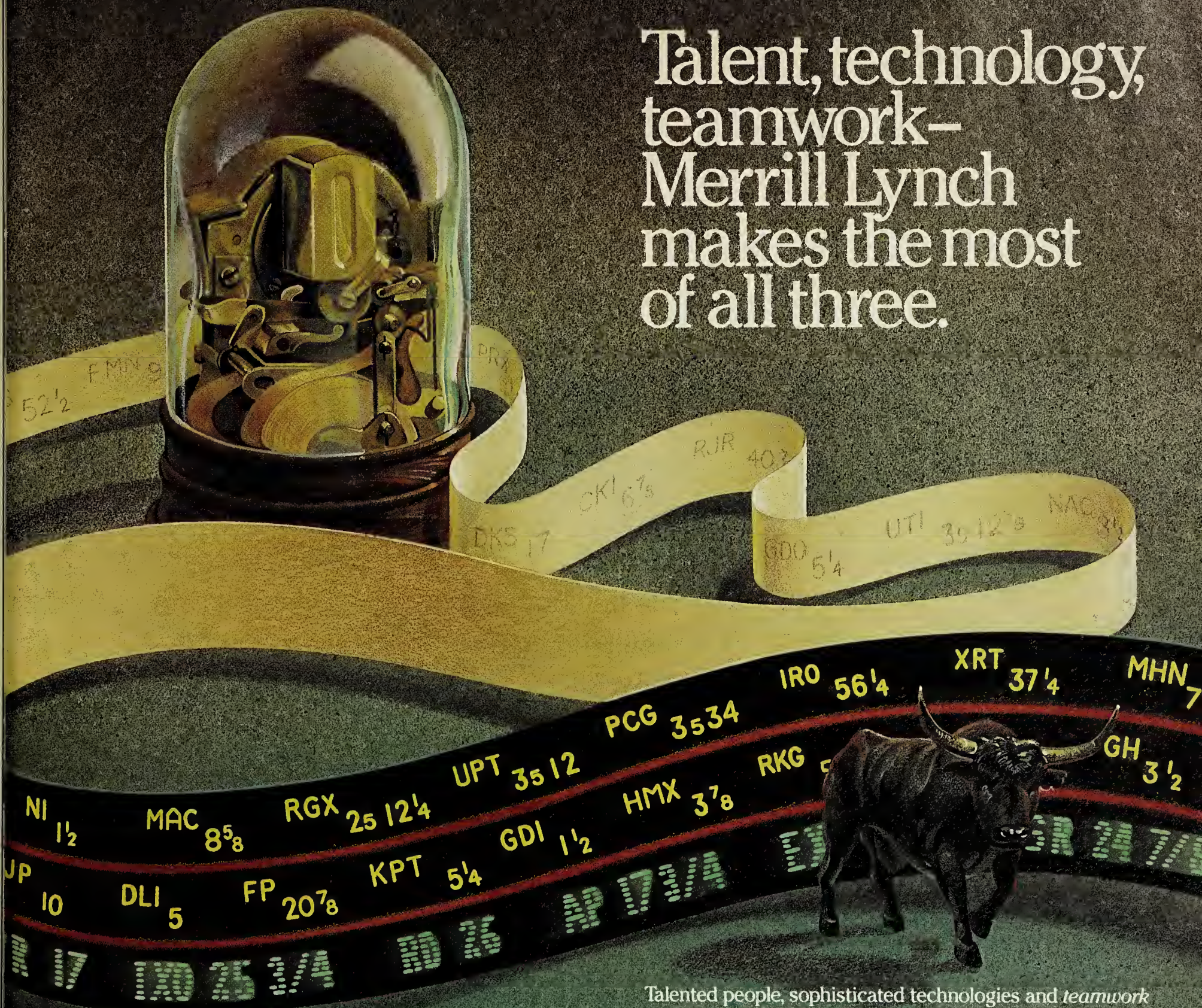


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Harrar, former features editor at Computerworld, is a free-lance writer based in Wayland, Mass.

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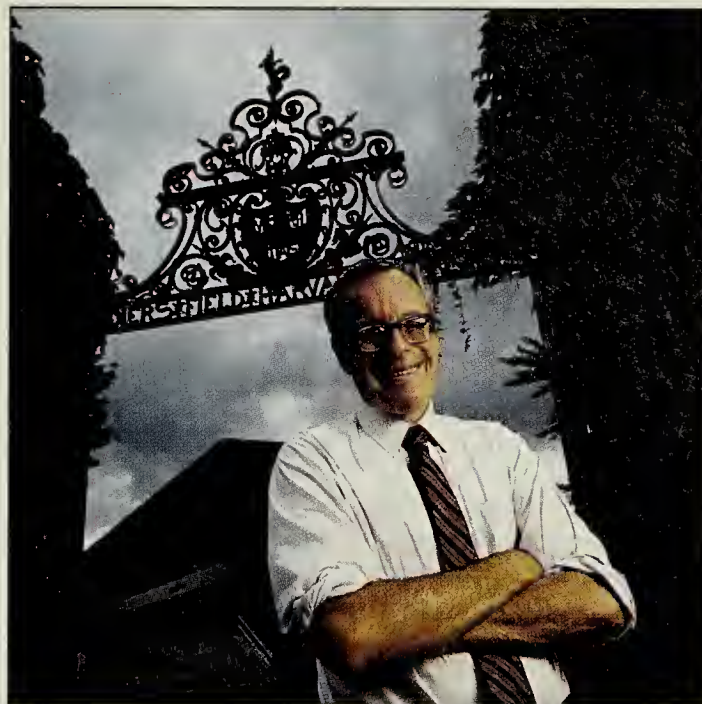
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STEVE LEWIS

Harvard B-school professor F. Warren McFarlan says the best computer-related jobs can be found in financial services, wholesale and aerospace

The most far-reaching change in the world of information systems management during the next five or 10 years may be the blurring of the distinction between careers in IS and general business management. One individual with a particularly clear perspective on this issue and a host of others in IS is F. Warren McFarlan, the Ross Graham Walker professor at Harvard Business School. McFarlan, who specializes in strategic planning and IS, has taught the management of information technology for nearly 30 years. Former Computerworld senior writer David Ludlum spoke with him for the Campus edition.

Q Can you assess the state of IS education at colleges and universities around the country?

A It varies all over the place. We're training people for very different roles. We've got edu-

cation for those who are going to be the doers — database architects, programmers and analysts. And then we've got education for those who are going to manage the departments that are going to be impacted. In general, the more specialized the technology, the better job we do of training people. It's easier to train people to do technical jobs than it is to think through the administrative environment within which the tasks are going to be executed.

Q Is there an adequate job being done in technical training?

A The job is being done better in the technical areas than in the nontechnical. It has a lot to do with career paths. What does a typical MIS professor get trained in? He gets trained in research methodology. He gets trained in computer science. Does he get trained in all the

nuances of applications development and how to make things happen in the real world? No.

Every year, I go to the leading conference of information systems academics. They are different from the people I spend most of my life working with because they are heavily focused on the technology kind of education, and they try to help people think about things in a very hands-on, how-to-make-it-happen way. They aren't very good at business policy or the broad view on how an organization operates and how the technology can be grafted onto it.

Q What advice do you give students interested in going into IS management?

A My advice to those students is this: You don't want to work in a company where IS is not a big deal. Go to a place where the expenditure

levels as a percent of sales are large, where there is very significant value added.

You've got to go to a company where intelligent technology really matters and where there is some *perception* that it really matters so that you don't get caught in some technical backwater of the organization. When something really matters, it reports higher, general managers are more actively involved with it, the compensation levels are higher and there's an ability to talk about your unit's contribution. At American Airlines, it's a big, big deal. Senior management knows it. IS management knows it. It's a great training ground. Citibank — again, a first-rate environment. People understand right from the chairman on down that IS is changing the nature of banking, and attention is spent on it.

Q What industries do you recommend?

A In financial services it's a big deal in terms of new product development, new channels of distribution. In the wholesale industry, IS can provide a big competitive advantage. In aerospace, there are very complex [computer-aided design and engineering] efforts. Look for places where [technology] is aligned with three or four things that the company has to do right to be successful. That's where the large salaries are; that's where the challenging problems are; that's where you can make a really big impact.

Q Do you find many Harvard graduate students gravitating to careers in IS?

A My guess is that it's a relatively limited number of people. Most of our students

are going off into marketing or production jobs.

I'm not sure if it might be 5% of the class or 7% of the class that would go into IS management.

Part of the reason is that a number of the IS management positions are filled by people coming right out of the technology side. Two years here doesn't give that kind of apprenticeship.

Our students have a very strong general management orientation. Their interests as they graduate are geared to major positions in profit centers and corporate leadership. It's a much smaller group that aspires to major leadership roles in staff activities like information systems.

Q Does this mean going into information systems is inconsistent with reaching a position of significant responsibility for a profit center?

A If we look for where successful information systems managers will come from in the early 21st century, we will find them having significant positions in both end-user departments and the information systems function.

They can enter the organization in either way. The key thing is they have to spend time on each side.

Look at it candidly: Student coming out of Harvard Business School carry along with them a \$65,000 debt.

Heavily focused on their minds are career opportunities and jobs that will allow them to extinguish the debt at a satisfactory rate so they can sleep better at night.

It's not clear to me that the compensation levels in information system entry-level jobs are commensurate with those in marketing and certain service management activities.

Q How much should your students know about information technology, even if they go into general management?

A We've put a very significant shift into our school's curriculum. We think that information technology is one of the major trends of the 1990s, and our core MBA program, as well as every one of our executive education programs, has a significant course on information technology and business transformation.

We don't waste a lot of time teaching people the intricacies of relational data architecture or the technical performance of different kinds of local-area networks because that technology tends to be very specific to a point and time. But in terms of developing an understanding of how the technology is changing organizational structures, how it's allowing new kinds of control techniques to be created, how it's improving responsiveness in the company, how it's opening up new channels of distribution and how new forms of electronic technology enable strategic alliances — those are really big things [and are discussed in a] required course in the first-year MBA program.

Q For those who do go into IS management positions, what are the challenges they will face in the next five years?

A The first one is the continual forging and maintenance of the partnership between themselves and key end-user constituencies. A second set of issues is helping to identify and work with end users to think about potential ways in which new technologies can be applied. Thirdly, there's a very important focus on simply making sure their organiza-

tions are up to speed in terms of understanding what the new technologies are and how they may impact the company. The final one is the ability to facilitate the transfer of information technology understanding throughout the organization.

Q What do you think of the prospects for IS managers going on to top-level management?

A In companies where IS is a big deal, it will happen. I'm a director at the Royal Trust Co. in Canada. Our chief operating officer has come out of the information systems function. He's a super high-energy person. He has total command of the technology but knows the rest of the business.

Q Do you think that's going to become more common in 10 years?

A Yes, because of the kinds of people who are going [into IS] and the diversity of the career path. If you want to be a general manager and you enter the information systems side, you may start as an analyst at a bank, move on as a branch manager and come back as manager of a large systems and programming group. You look for significant management jobs on each side as you move on up in the organization.

I emphasize the word "line jobs" — people who help in dealing with real customers, real problems, feeling real pressure. The people who enter the information systems function who can head large project teams and then gain insight into what it really takes to be successful are the ones who have the careers. ◀

Ludlum is a former Computerworld senior writer.

Want that BMW? Specialize!

Niche knowledge is nice, so know your acronyms

By Michael Cohn

When I first started out, just saying you were in information systems was saying a lot. It got you a car loan. Realtors sat up and took notice. Eligible women stalked mall book stores, throwing themselves on unsuspecting souls in the computer section, even when it

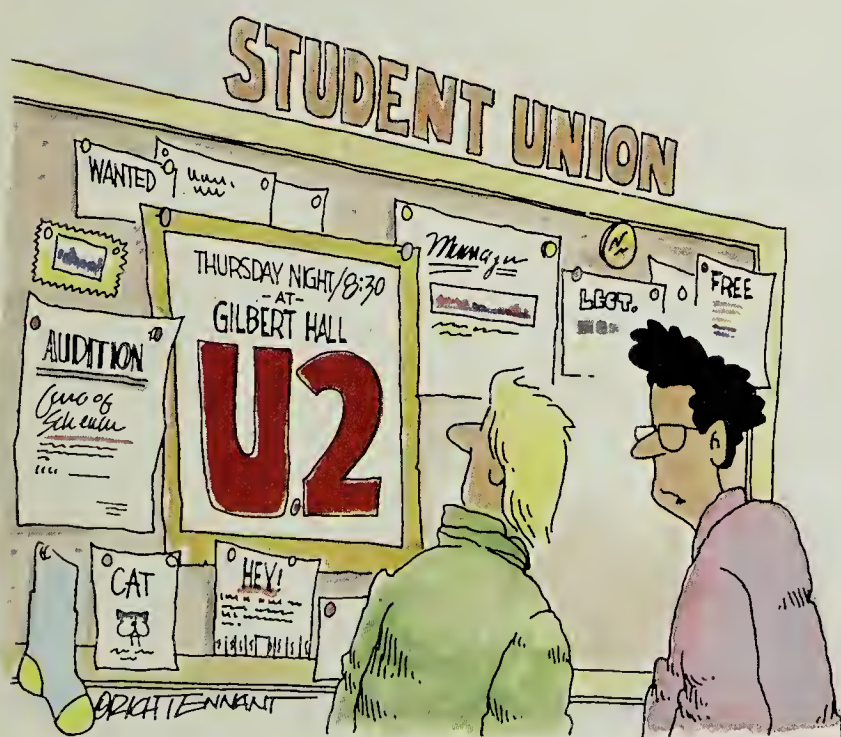
was just a 12-year-old buying Hanukkah gifts for his uncle in Toledo. Believe me, those were the days.

Today, IS has lost its glamour. Everyone knows how to use a computer. Most folks mastered Pac-Man years ago. And Cobol programmers are a dime a dozen, although they still want 60 bucks an hour and a window office.

So let me offer some advice to students at the fine universities and institutes around the globe: You can't just go into IS anymore. You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

If you want to get a great offer, make the big bucks and lease the German-made convertible of your choice, find your niche in the computer field. Before it's too late, consider one of the following:

- **The X fields.** Anything that ends in X is big right now, like Unix or AIX or KIX or TRIX. Just say it with a straight face, and you'll be heading for six digits.
- **Multimedia.** Multimedia is the wave of the future. Companies are racing to integrate video, audio, text and touch screens, all under the control of a single end user. Not only will this change the way we work and use information, but no one will ever have to miss another episode of General Hospital again.
- **ISDN.** ISDN is hot, and everyone is looking for someone who knows what it stands for. Even hotter is TCP/IP. Companies are impressed by any acronym that contains a slash, and you'll definitely get called back for a second interview. But if you really want the whole enchilada, bone up on X.12 or X3S3.3 or anything else that has a period in it somewhere. They're on the top of every employer's list, until someone invents an acronym with a semicolon or two.



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NOTES

AN APPLE FOR THE STUDENT.

►When freshmen arrived at the Des Moines, Iowa, campus of Drake University this fall, they found Apple Computer, Inc. Macintoshes installed in their rooms.

The campus is in the process of installing a digital information network to serve as an information exchange between students, faculty and administrators.

The computers are university owned, but the students pay Drake for their use.

- **NI.** Artificial intelligence is out, natural intelligence is in. Nobody wants that artificial stuff anymore, unless it's less filling or tastes great.
- **Assembler.** No matter what anyone says, there is still a need for assembler programmers — primarily so they can teach assembler.
- **JEDI.** EDI is already passe. Everyone in the Fortune 1,000 who wants electronic data interchange has got it by now, and data interchange specialists are being laid off by the truckload. The new field is JEDI, or Junk EDI, which involves figuring out ways to electronically transmit coupons for aluminum siding or pictures of Ed McMahon.
- **Computer security.** Computer security is the brightest field in IS. Companies spare no expense protecting themselves from hackers and unauthorized access. The sky's the limit for specialists who can learn and control every detail of corporate assets, security algorithms and vital financial data. Best of all, these positions tend to have remarkable job security, for some strange reason.
- **Computer engineering.** There's a tremendous shortage of computer engineers. People still think computer repair means being glued to a beeper and working all hours of the night. Companies are aggressively trying to shed this outdated image and are paying top dollar for good technical people. In fact, hardware maintenance is the top priority of technical recruiters

You can't just go into IS anymore. You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

today — that and finding technicians who know how to fix beepers.

• **The Big Eight.** The Big Eight is always looking for entry-level IS consultants. Sure, the hours are brutal, the travel is hell, and you work like a dog just to move up the ladder. But with a little patience, you'll soon be working for the Big Six and then the Big Four, and at least it will seem like you're getting someplace.

• **Contract programmers.** Despite the gluts and layoffs in other industries, contract programming continues to flourish. IS managers are always trying to find contract programmers — especially after 4:30 p.m. when their cars disappear from the parking lot. ◀

Cohn is trying to be a computer salesman in Atlanta.

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The dormpreneurs

High-tech hotshots who launched lucrative careers from campus

By Alan J. Ryan

Three years ago, Justin Boyan entered the University of Chicago as a freshman. He was also chairman of his own company. Today, barely in his 20s and a senior mathematics major at the university, this "dormpreneur" is working on Version 5.0 of his own homegrown communications software package. He says he has earned enough from his business to pay for his education.

What it takes to be an entrepreneur, Boyan says, is a lot of stamina, the ability to withstand rejection, persistence and a good product. Other successful computer industry figures who opted to start their own businesses during or instead of college agree.

At age 34, West German native Andy Bechtolsheim's resume is simple: He arrived in the U.S. as a student in 1975, earned a master's degree at Carnegie Mellon University, began a Ph.D. program at Stanford University, constantly toyed around with computers, dropped out of Stanford and helped found Sun

Microsystems, Inc.

Did Bechtolsheim make the correct choice in forsaking his Ph.D.? If Sun's success is any indication, the answer is a resounding yes. Sun's 1989 revenue was \$1.7 billion with earnings of \$60.8 million.

Boyan's business, Boyan Communications, had a more modest beginning: He started it in October 1986 from his home in Columbia, Md., while still in high school.

"I had a modem, but I was too poor to buy any communications packages," Boyan says. He began using shareware programs that were available through bulletin boards, but even these did not satisfy his needs. "So I started writing my own software, and the program



MICHAEL DELL found early sacrifices had later payback

WILL VAN OVERBEEK



DAVID JOEL

JUSTIN BOYAN had stamina, an ability to withstand rejection and a good product

kept growing," he says. Boyan began marketing his Boyan Communications software for IBM Personal Computers and compatibles as shareware when he was a senior in high school.

To date, Boyan has sold 2,000 registered copies of the package, known as Boyan. The software sells for \$40 and was on *PC Magazine's* "Best of 1987" list.

SCHOOL'S OUT

Not all dormpreneurs start their ventures while they are in college or high school, however. Some drop out to get going,

while others begin immediately after graduation.

"A good time to start a business is right after you finish school, because you're used to living like a student," says Dan Bricklin, a software entrepreneur who has founded three separate companies.

Bricklin created the successful commercial software spreadsheet program, Visicalc, while he was in his late 20s and was still a student at Harvard Business School.

An enterprising individual who decides to work for someone else before starting a

business may have a tough time starting a business later on, Bricklin says, because most people find the spartan student lifestyle tough to go back to once they've left it.

Michael Dell, who founded Dell Computer Corp. at age 19, agrees. He says that when he dropped out of the University of Texas after his freshman year to start his own business, he was able to get by on a salary of \$20,000 per year.

However, early sacrifices can have future paybacks. Today, 25-year-old Dell is chairman and chief executive officer of a company that pulls in nearly \$500 million annually. His personal wealth is estimated to be approximately \$60 million.

Dell says he did not wait to finish school before making his mark on the world because he saw an immediate need in the market for a business in which PC users could buy add-ons and upgrades without having

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"A good time to start a business is right after you finish school, because you're used to living like a student."

Dan Bricklin
Software entrepreneur

to pay high mark-up prices. His solution: mail order.

Today, Dell's company sells complete PCs through the mail.

Bricklin, who is currently vice-president at software vendor Slate Corp. in Cambridge, Mass., says that while a young entrepreneur may not have much experience in dealing with the business side of starting a company, "life is a good teacher."

Boyan agrees. "There are a lot of business aspects to this I've had to learn about — sometimes the hard way," he says. For instance, he adds, "I know a lot about copyrights and postal regulations now."

Still, Dell says, things have a way of coming together if you're cut out for the role of entrepreneur. "If you have to read how to succeed, if you have to ask somebody, if you have to go to lots of classes or seminars," then you might not have what it takes to start your own business, he

says. "It's a gut feeling — at least that's what it was for me."

However, even those who do possess the entrepreneurial spirit learn that starting a business is not easy. Sometimes, Dell says, getting a business off the ground when you are young is more difficult because people do not always take you seriously.

When Boyan started out, he says he wrote letters to authors of other communications programs to share his ideas on what kinds of things such programs should include. "I didn't get any feedback," he says, "so I just jumped into it myself."

Dell adds: "You have more energy and ability when you're young. The hours I worked when I was starting out — lots of people said if I were in my 40s, I would not have had the same level of energy. But I haven't gotten there yet to find out if that's true."

Boyan admits he's been through some rough times, especially in trying to balance business and school. "I always feel as though I'm not devoting enough time to one or the other." Filling the orders is manageable, he explains, but finding time

Breaking in is hard to do . . .

The entrepreneurs we talked to said that lots of great ideas for the computing industry came to them while they were sitting in classes, but it was not always the classes that inspired them — the most important inspiration comes from inside. You have to know whether you have an entrepreneurial nature. Are you a leader, or do you feel more comfortable taking direction from others?

If you are a leader, read on for some do's and don'ts from successful entrepreneurs:

- **DO** go with your gut instincts.
- **DON'T** hesitate when opportunity knocks. If you have an idea worth exploring, don't wait until you finish college or graduate from school, because someone else may have the same idea.
- **DO** take classes to learn how to run a business.
- **DON'T** try to push an incomplete or substandard product into the market just to be first.
- **DO** solicit advice and feedback from people you respect and trust.
- **DON'T** count on getting rich overnight.
- **DO** get used to rejection from others. Fellow students, companies, loan officers, venture capitalists and even potential employees may scoff at your ideas.
- **DON'T** rest on your laurels once you start to succeed. Keep pushing for more fresh ideas so your company can grow and mature.

ALAN J. RYAN

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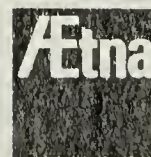
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to continually update the code to meet ever-changing telecommunications requirements, such as high-speed modems and new protocols, is challenging. Boyan's time may be even more in demand in the future; he plans on pursuing a graduate degree in computer science.

Young people, however, typically have fewer commitments and may bounce back more easily if their businesses do not pan out, Dell says. "You have less to lose and probably don't have a family relying on you for support," he says.

One business started by students that did pan out — and which has been profitable every quarter but one since its inception in 1982 — is Unix workstation vendor Sun.

Bechtolsheim, Sun's vice-president of technology, helped to found the firm with Scott McNealy, currently president and CEO, while Bechtolsheim was a Ph.D. candidate at Stanford. At the time, Bechtolsheim had job offers from other companies, but none seemed to understand the workstation market, he explains, "so I figured I was better off doing it myself."

Today, Sun is looking to other entre-

Young people typically have fewer commitments and may bounce back more easily if their businesses do not pan out.

Michael Dell
Dell Computer

preneurial minds, including those of students, Bechtolsheim says. "We are setting up a new laboratory where we want to work with people who have good ideas about good future products," he says. In charge of the laboratory is Bill Joy, vice-president of research and development, who joined Sun just days after the company's inception. Joy came from the University of California at Berkeley.

Bechtolsheim says that in the competitive environment of the 1990s, it might be nearly impossible for anyone to start an-

other hardware company such as Sun. "We have 2,000 engineers at Sun, which is an incredible investment," he says.

However, there are markets, such as software, that entrepreneurs can get into with little or no venture capital. "The whole infrastructure cost of buying the tools and the platform can often be done by putting a second mortgage on your house," he says. A good programmer could probably write an interesting software package in a year, he adds.

Students who are looking for large markets and big dollars at the start may be overlooking lots of opportunities, Bechtolsheim says. For instance, Sun will likely ship 150,000 to 200,000 of its Unix-based workstations this year; a student who can sell a package to just 5% of Sun's installed base would be doing quite well.

"The people who really do well are those who feel there is a problem to be solved and who really push the thing forward," as opposed to those who are looking to get rich quick, Bechtolsheim says. ◀

Ryan is a *Computerworld* senior writer.

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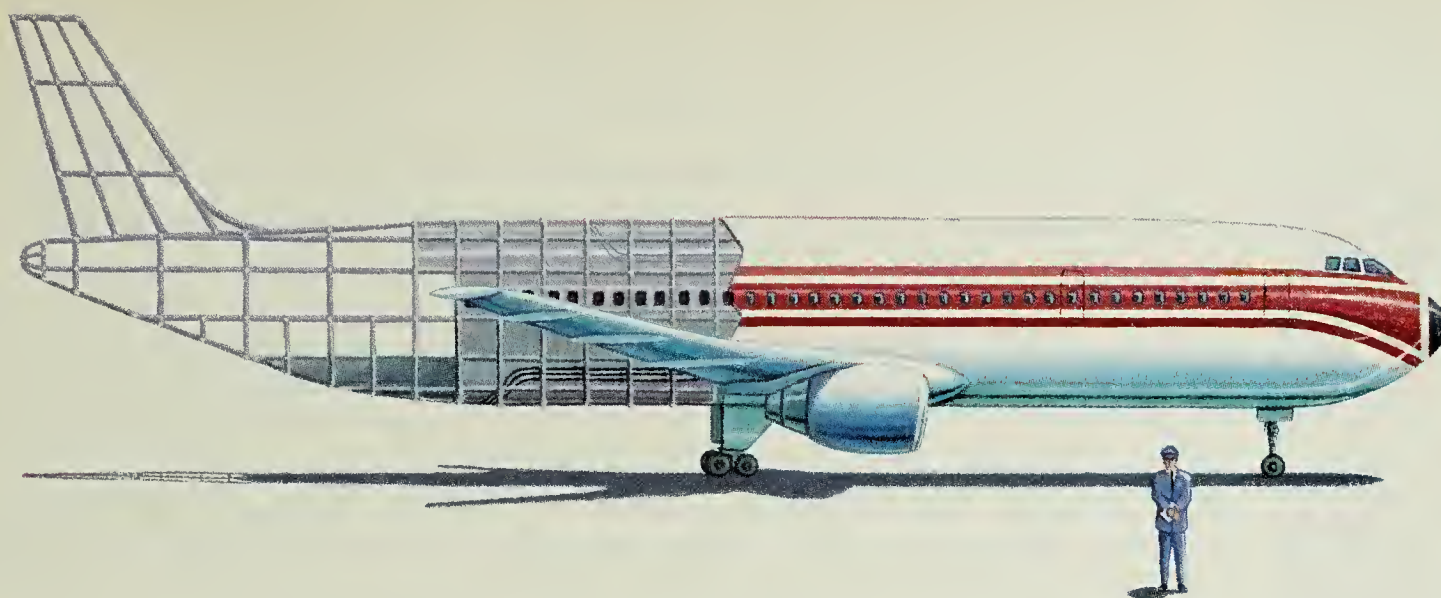
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GLENN REID

From circuit boards to the IS circuit

"In engineering school," Ricardo Fishman says, "they don't tell you that you need a broader view of the world." Significant words from the 24-year-old Fishman, who holds a degree in electrical engineering (EE) from Boston University. Fishman's sentiments point to a subtle and steady trend: A small percentage of EE graduates are being drawn to information systems careers because they want to be more involved in the business side of the technology. They say they want to move into positions where they can use their technical knowledge to influence corporate direction.

For Fishman and other EE students, the path into IS is neither simple nor well beaten, but it has all the earmarks of becoming one of tomorrow's most popular tracks.

For his part, Fishman, who lives in Allston, Mass., complemented his regular EE course load with offerings outside of the department — courses such as technology strategy, engineering economy and international finance and accounting.

A native of Venezuela, Fishman says he wanted a better understanding of how business is conducted in the U.S. He says he found the EE program to be too focused

on the technology and on chip- and board-level learning. Seeing technology's broad view and strategic side were key for him, as was learning about technology's implications for engineering. In this sense, Fishman says, he didn't think EE was going to be fulfilling for him.

"In the real world, there's a tremendous gap between the engineering community and the business community. The business community is definitely dominant because it has the power that comes with bottom-line financial control," Fishman explains.

James Bruce, a professor of electrical engineering at MIT, acknowledges that there is still a lack of coupling between formal degree programs and what IS requires.

"We're always going to have a lot of discontinuity between someone's educational background and IS," he says. Bruce, who is also vice-president of IS at MIT, says he hires electrical engineers from MIT and elsewhere to work in the school's IS department but adds that there are still a lot of people coming into the IS profession from a wide variety of disciplines.

"What we're really interested in are their accomplishments in information technology areas rather than a specific

Interested in influencing corporate direction, electrical engineering majors are crossing over to IS positions

By Kathleen Gow

STUDENT PROFILES



Sean Joseph Walsh

Age: 24

► Bachelor's, business administration and finance, Texas Tech University, Lubbock. MBA in Information systems, Texas Tech. ► "I'm currently working for Pepsi Cola, Inc. in Albuquerque, N.M., as a distribution management trainee. In 10 years, I would like to be the VP of operations of some area in Pepsi."



Patricia

Ramatowski

Age: 38

► MIS major, Southern Illinois University, Edwardsville. Master's, Information management, Washington University, St. Louis. ► "I work for a Department of Defense agency as a programmer/analyst. I would like to advance into an information management position."

degree path," Bruce says.

Electives and part-time jobs are an important consideration. A student with a part-time job maintaining Unix systems, for instance, would be well prepared to enter the software community, Bruce says. "The bottom line is, there's no such thing as a standard EE degree," he says.

While MIT's IS department hires electrical engineers straight out of school, it is rarely an easy transition. Dave Berlien, college relations supervisor for business and computer systems staffing at Du Pont Co. in Wilmington, Del., says his company doesn't hire electrical engineers for systems jobs. Instead, Du Pont is looking for computer science and IS majors.

Berlien says he has been happy with systems engineers from the University of Virginia, computer engineers from Ohio State University and computer technology graduates from Purdue University and the University of South Florida: "We like those candidates because they are very applications-oriented and have a lot of project experience. It's a good fit."

He admits, though, that because the IS area is a new one and has been exploding in size during the last few years, Du Pont ends up taking people from many different fields.

Berlien notes that hundreds of EEs work in Du Pont's systems departments, but most of them have been in the work force for a while. "It's on-the-job training. These employees bring with them strong technical backgrounds. A lot of them have been involved in manufacturing, worked out in plants and understand that side of the business," he says.

Michael Ferone, personnel representative at NCNB Corp., says his organization has hired EEs in the past for IS jobs, but it doesn't seek them out: "We don't want strictly technical people. We want people with more of a business background who can communicate with users."

NCNB would consider electrical engineers along with computer science grads for systems jobs, Ferone says, but the bank looks carefully for strengths such as leadership, communication skills and involvement in extracurricular activities.

The need for strong communication skills as a requirement for entering IS, especially management, was echoed by Robert Gallagher, director of information technology services at Rensselaer Polytechnic Institute (RPI) in Troy, N.Y. The information business is so dynamic, Gallagher explains, that people working in the field have to be receptive to learning new things. "If they resist change, they will become obsolete, and opportunities will be limited," he says.

Bruce adds that a large number of RPI students get MBAs after earning a bachelor's degree in a technical field and are well suited to understand technical and business issues. The job seekers that successfully move from electrical engineering into IS often acquire a more business-oriented degree to help make the switch.

"If a company sees an EE who's gotten an MBA,

that shows where the person is headed," says Jim Scimone, managing director at the Wellesley, Mass., branch of Source EDP.

While Scimone says he does not see a major movement of electrical engineers toward IS careers, he does see a growing trend of traditional service companies looking for software engineers to develop communications software.

Steve Nichols, a student at Texas Tech University, says combining a business degree with a technical undergraduate degree is the wave of the future. "A lot of engineers are doing it because they realize it's important to see both sides of the business," he explains. Nichols started an MBA/MIS degree program after finishing his undergraduate degree in EE technology.

After he completes his degree, he will work for Sandia National Laboratories as a programmer and analyst. Nichols says he is sure he would not have been considered for the position at Sandia based solely on his EE degree.

"We don't want strictly technical people. We want people with more of a business background."

Michael Ferone

NCNB Corp.

The mix of engineering and MBA programs was a boon for Nichols. The engineering program forced him to do group work, while the MBA program forced him to give frequent group presentations, which has been important for building his communication skills. Furthermore, the exposure he has gained from marketing, management and finance courses has given him a better understanding of business and other people's needs.

Boston University graduate Fishman, however, says that his technical degree, coupled with his jobs at two technology consulting firms, gave him an edge over his more business-oriented co-workers for consulting and selling. "For instance, if we were working for a manufacturing firm that was trying to integrate systems in different places, I could ask the right questions. My colleagues often didn't understand the technology, so it took them longer to come up to speed," he explains. "An electrical engineering degree made my life easier — better than an MBA."

As for the problem of building a background that meets the industry's needs and selling it to employers, Fishman is realistic: "People expect EEs to develop hardware or do software maintenance support. If you want to get into something else, it's a matter of marketing yourself and having the right attitude." ◀

Gow is a free-lance writer based in Medford, Mass.

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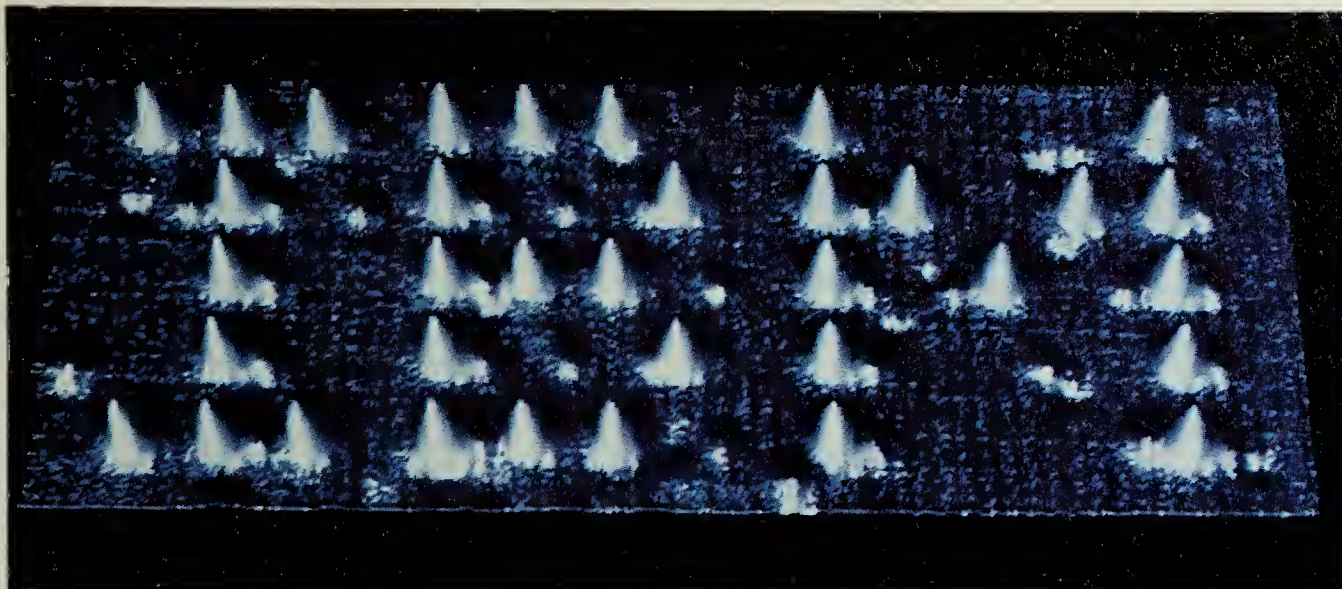
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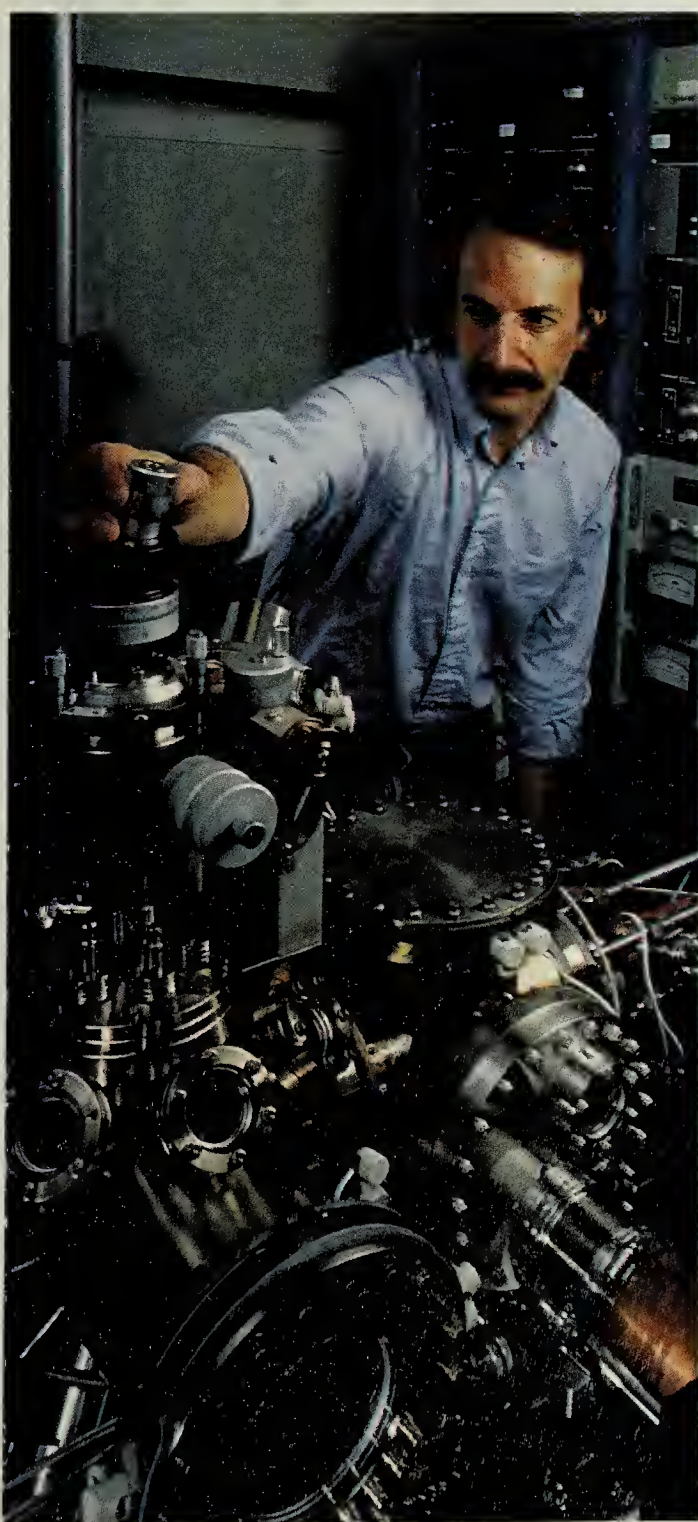
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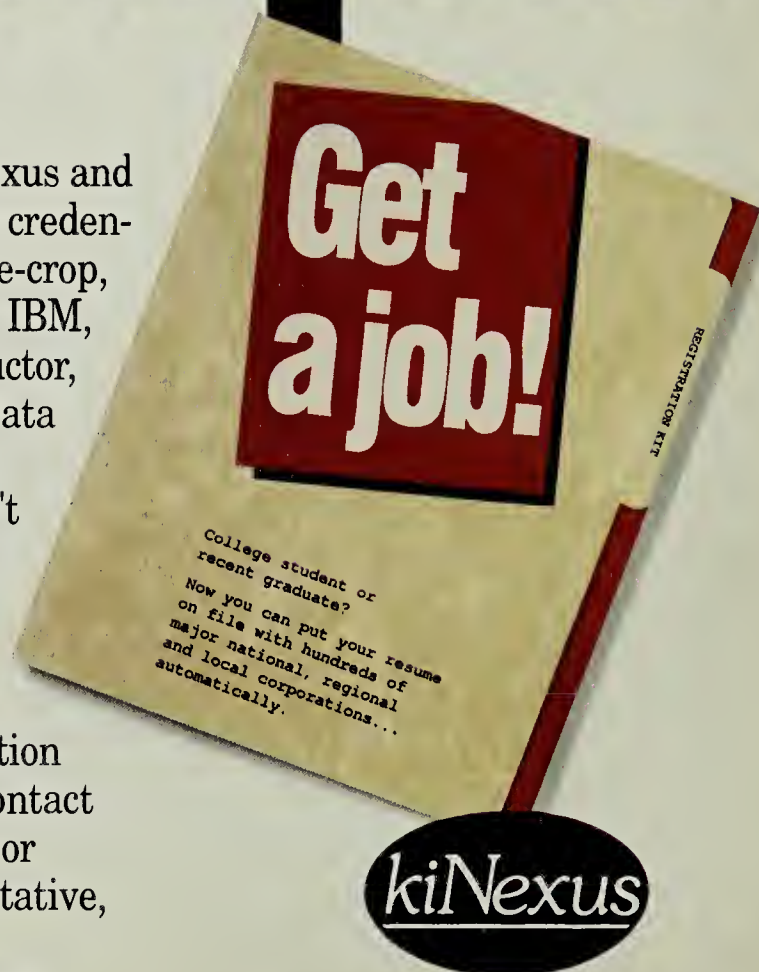
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IS needs to fill minority void

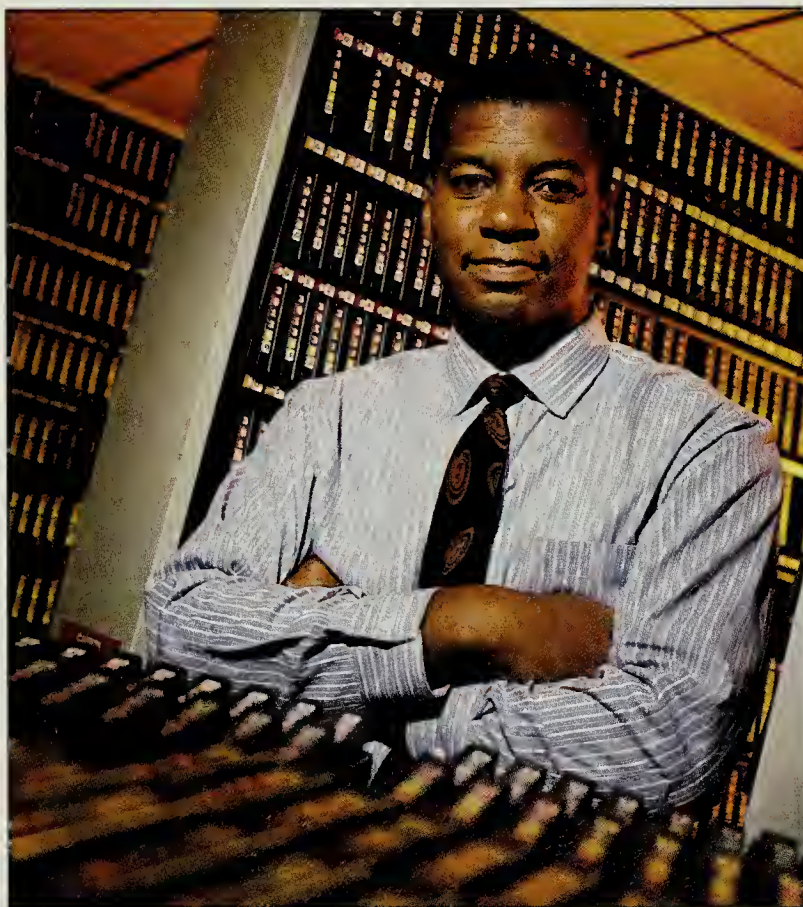
By Amiel Kornel

At first glance, Robert Henderson's future seems assured. Hard-working and dedicated, he has advanced his career in information systems at a fast clip. In the dozen or so years since landing his first job as a night computer operator for an insurance company, he has risen to become IS project manager at a food distributor, managing teams of up to 18 programmers and analysts.

Henderson worries, however, that further career opportunities may be limited. As a 29-year-old black man, he fears being shut out of the senior management ranks of a profession that is overwhelmingly white.

"I'm at a point now," Henderson says, "where it's going to be very hard for me to move up any further." Line management, he suspects, marks the end of the line for a black man carving out a career in IS. "We are not the ones typically in the VP of IS positions," he notes.

His concerns are well founded. Computer professionals, academics and recruiters say minority men and women rarely attain the highest ranks of information systems management. Although they are



ROBERT HENDERSON worries that his career path may be limited by color barriers

one of the symbols of modern progress, computer careers appear to be anything but color-blind.

"The field is attracting blacks, but not in the numbers it should be," acknowledges Vivian Wilson, president of Black Data Processing Associates (BDPA). "Information processing requires a strong background in statistical, mathematical and science disciplines, and minorities are generally not strong in these areas in school." As a result, young minority students often hesitate to embark on a career path that might simply lead to a dead end. This compounds the problem by keeping the pool of minority IS job candidates low.

"Your chance of experiencing great rewards is probably not as good as in other professions," says Bob Mathews, a black systems manager who is Henderson's boss at Richfood Holdings, Inc.

KATHERINE LAMBERT

NOTES

REGISTER BY PHONE

► Students at the University of Pennsylvania will be going to PARIS this year to avoid registration lines. PARIS, the Penn Automated Registration information System, allows students to register for their classes from their dorm rooms with a touch-tone telephone.

Students can dial into a computer, and a mechanized voice walks them through the process. By using the phone as a keypad, the callers can be registered for their classes within five minutes.

"It's very hard to break into the bastion of white male dominance," says Beverly Lieberman, an executive recruiter at Halbrecht Associates.

The pattern of exclusion is not reserved for blacks. Asked what affect being Hispanic has had on his career, Nicaragua-born Julio Guillen, IS manager at Bio-Rad Laboratories in Hercules, Calif., says, "There are probably certain situations when promotions have gone elsewhere."

According to Equal Employment Opportunity Commission figures, progress for minorities has been at a virtual standstill at the high end of the computer career ladder. In 1988, 92% of IS managers were white and 8% were minorities — the same percentage split found in 1980 and 1985 (see chart page 41).

WOMEN ARE SCARCE

The problem is particularly dire for minority women. When Halbrecht Associates was asked to recruit a minority woman as IS director for a big organization in New York, its nationwide search turned up only six potential candidates, Lieberman says.

"Compared to other business functions, there are a fewer number of minorities interested in information technologies," says James Senn, director of The Information Technology Management Center at Georgia State University in Atlanta.

For those minorities who do enter the field, climb-

Although they are one of the symbols of modern progress, computer careers appear to be anything but color-blind.

ing the corporate ladder requires working extra hard to overcome doubts that some colleagues may have about their abilities. "I make sure that I perform at at least 120%," Henderson says. "I make sure that I break every kind of stereotype that anyone may have."

According to Chet Holmes, an account manager at Candle Corp. in Los Angeles who started his career in IS, many blacks are interested in the profession, but few move up quickly. "What keeps many blacks from moving forward is not being able to identify a mentor within the department," Holmes says.

Wilson agrees and points out that her organization, with a national membership of 1,400, is actively working to encourage its members to become mentors to high school and college students. BDPA sponsors a national competition in computers and information processing for high school students and gives scholarships to winners. This year's competition involved more

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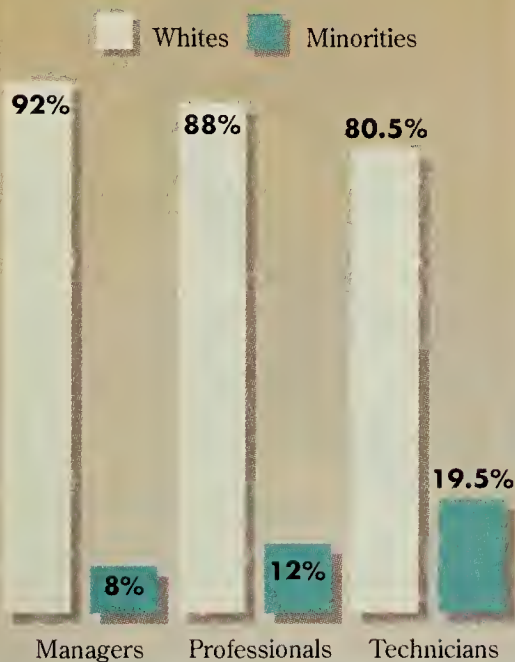
than 1,500 students in 18 cities. "The idea is to expose students to what it is like to work in this field and encourage them to go on to college with this in mind," Wilson says. "In this way we act as role models."

Minority IS professionals report that their achievements and failures are often magnified in the eyes of white management. "They expect you to be more on the ball," says Debbie Gore, a black information security administrator at Federal Mogul Corp. "You have to prove yourself."

This intensive scrutiny, however, can be a benefit, she says: "If you end up getting a reputation for being very good, things move your way."

In the minority

The number of minorities in the computer field is low, with the fewest in upper management posts



Source: Equal Employment Opportunity Commission

"I consider my Asian background as an asset," says Duc Won, Korean-born president of Applied Systems Institute in Maryland. He says he has gained an aura of competence because Asians are viewed as gifted in technology-related areas.

Although some Asians say being characterized as technologists can become a liability when later seeking a management position, Ann Li, corporate vice-president at Paine Webber, Inc., says the problem is faced by "anyone who is a techie."

Nonetheless, the question remains: Why have so few minorities broken into senior management positions in one of the fastest growing professions?

Part of the answer, no doubt, lies in the intolerance bred by age-old prejudices. Blacks, Hispanics and Asians interviewed for this story, however, insist that they've

rarely experienced open hostility and prefer using euphemisms such as "color sensitivity" and "traditional attitudes" when talking about what in an earlier era would have been simply labeled racism.

"You can't blame anyone for a mind-set that has been around for a couple of hundred years," Henderson says.

Minority professionals assert that their career advancement depends on their skills at least as much as on their race. Minority IS professionals also cite some of their own cultural traits and traditions as potential obstacles in their efforts to climb to executive IS positions. They say these must be modified before climbing the IS career ladder becomes possible.

Jauruey Chew, a network switching director at US West who was born in China, notes that Asian culture emphasizes unquestioning obedience and silence, traits that are an anathema to U.S. management technique. "The American corporate environment is interested in having people take the initiative," she says. Chew, who oversees the work of a staff of nearly 400, has clearly learned to adapt.

For young blacks and Hispanics, a lack of role models in science- and engineering-related fields can pose a problem. While accounting for 10% of the total work force, blacks held only 2.2% of the nation's science and engineering jobs in 1986, according to a recently released report by the National Science Foundation.

"Normally, in a black household," Henderson says, "it's very rare to find a college-educated black man who had anything related to a scientific training." He says he hopes his experience and that of

Minority IS professionals report that their achievements, like their failures, are often magnified in the eyes of white management.

other minorities will change that. "We're starting the tradition now," he says.

Educators are also paying closer attention to providing minority students with the math and science training they need to prepare for a career in technology. In the Washington, D.C., area, big businesses are funding an all-minority program in which 600 to 700 students are receiving help in developing their math and science skills, according to Lynford Lautz, executive director at the Fairfax County Public Schools Education Foundation.

Such measures leave room for hope, IS professionals say. As attitudes change and training begins to bear fruit, minorities may finally appear in greater numbers at all levels of IS. "Sooner or later," Gore says, "the walls have to come down."

More information can be obtained from the BDPA by calling (800) 727-BDPA.

Kornel is a former *Computerworld* features senior editor and is enrolled at MIT's Sloan School of Management.



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BIG INNOVATION ON CAMPUS

By Alan Radding

Colleges are at the forefront of technological advances

Your music course, chemistry class and language lab are showcases of multimedia computer pyrotechnics. The campus electronic mail system is so advanced, it makes even seasoned corporate network managers envious. And that tweedy, head-in-the-clouds philosophy professor of yours is hard at work programming interactive hypermedia courseware.

Surprised? Some of the most advanced and exciting computer technology developments are currently taking place on college campuses. "Universities and colleges have always led the way in innovation," notes Bill Graves, a mathematics professor at the University of North Carolina in Chapel Hill and director at the Institute for Academic Technology, an IBM-funded organization that provides fellowships to professors working on innovative academic computing projects.

Much of what students experience today by way of computer innovation on campus, Graves says, will become commonplace in the corporate world tomorrow. Computer science, information systems and electrical engineering students already accustomed to interactive multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

The breadth of computer innovation on campus is startling. A conference on academic computing earlier this year highlighted over 100 college campus comput-

er projects, covering everything from economics to geophysics to clinical psychology to music.

This innovative activity has been spurred in part by the large amount of money being poured into college computing. IBM alone spent almost \$600 million during the last five years, says L. G. "Buzz" Waterhouse, IBM's vice-president of academic IS in Milford, Conn. During that period, colleges launched over 3,000 IBM-supported programs. Other major computer vendors such as Digital Equipment Corp. have also aggressively supported college computing efforts.

Vendors are attracted to academic computing for more reasons than just the potential profit of selling computers to colleges, although Waterhouse concedes that colleges are "an important market for our products." IBM also sees the academic community as a leading source for patentable research, the front line in the development of industry standards and a strong influence on the direction of government and corporate

computing. Colleges were quick to recognize the potential of the computer — particularly the personal computer — and as a result, “personal computing is very widespread,” notes Kenneth King, president of Educom, a Washington D.C.-based organization involved in computing and communications in higher education.

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery, according to King.

So far, networking has attracted the big

money and the greatest interest from the corporate world. “Some universities are going into their third generation of networks,” King reports.

At these schools, campuswide Ethernet networks are already obsolete, superseded by 100M bit/sec. fiber-optic local-area networks. Campuswide networking itself is a fact of life at the top 200 or so universities, he estimates, and worldwide inter-networking between campuses is already well established.

Project Athena, a massive multivendor networking effort at MIT in Cambridge,

Mass., is one of the largest and best known college computing efforts.

The goal of Athena since it began in 1983 has been to create a single campuswide network using equipment from different vendors, according to Janet Daly, a Project Athena information officer. Students and faculty would need to learn only one operating system and could access any application or system anywhere on the network.

Before Athena, the campus was divided into many different computer systems, each from a different vendor, and users couldn't move easily — if at all — from system to system.

IBM and DEC committed a total of \$50 million in equipment and maintenance to the effort, along with five staff members each. MIT pledged to raise another \$20 million. Although originally intended as a five-year experiment, the partners agreed

Students already accustomed to interactive, multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

to extend the project three more years because courseware took longer to develop than expected.

POPULAR ITEM

Today, Athena has 9,400 users who access the system at least twice each week. As of March 1990, more than 92% of MIT's undergraduate and 55% of its graduate students were using it. Athena currently handles about 1,000 Unix workstations on a network designed to accommodate up to 10,000 machines.

What is extraordinary about the project is the number of technologies that have passed through Athena on their way to widespread computing acceptance. For example, Athena is recognized as having pioneered heterogeneous (multivendor)

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distributed computing. It helped establish Unix as the leading open operating system. The X Window System, a graphical user interface, as well as Kerberos and Hesiod network services (for security and file naming, respectively), are also Athena offspring.

Other Athena-like projects have cropped up on campuses across the country. At Carnegie Mellon University in Pittsburgh, the system is called Andrew, another IBM-supported effort. Andrew began as a mainframe time-sharing system but eventually evolved into a "marriage of time-sharing and PCs," an Andrew staffer says.

Today, Andrew appears to its 9,000 users as a giant, seamless Unix file system that even reaches out to other schools. In effect, it is a nationwide file server.

FROM COLLEGE TO THE REAL WORLD

Andrew has had an impact on the corporate environment. For example, the Open Software Foundation in Cambridge, Mass., selected the Andrew file system as part of its distributed computing specifications. The Andrew file system itself is being marketed as a commercial product. Andrew is the base of the University of Michigan's Institutional File System (IFS), an effort to create a massive, heterogeneous network built around an IBM mainframe as a central file server.

The scale of the project is staggering: IFS currently handles 15,000 desktop computers (8,000 Apple

Computer, Inc. Macintoshes, 2,000 Unix workstations and the rest DOS and OS/2 PCs), but IFS designers expect to accommodate as many as 30,000 desktop devices by the mid-1990s, says Ted Hanss, IFS project manager.

Communication is carried over a fiber-optic network backbone linking 75 buildings around Ann Arbor, Mich. The system is expected to be up and running this fall for the 6,000 students and faculty members who will be its first users.

Projects such as Athena, Andrew and IFS, despite their scale and complexity, are actually low-level tools that facilitate communications and make computer use easier. Much more campus innovation is taking place at the application level, where instructors are developing their own computer courseware. These applications make increasing use of the interactive multimedia capabilities of the latest PCs.

"Students learn through multimedia," Graves says. With desktop computers powerful enough to accommodate digitized sound and full-motion video in a Windows environment, he explains, professors have the tools to create very effective courseware. The result can be a learning experience unlike anything that can be done through conventional classroom and lab techniques.

For example, an interactive chemistry videodisc is available that creates dramatic simulations of what



SHORT FUSES.

► Computers in dorm rooms are becoming as common as refrigerators and televisions, according to a recent survey of 200 Davidson College students in North Carolina. *The New York Times* reported that 92% of the respondents had a computer in their rooms.

Of the top nine favorite dorm-room appliances, computers ranked sixth behind clocks, lamps, stereos, hair dryers and refrigerators. Curling irons, irons and hot pots followed.

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happens when certain chemicals are mixed — events that no person wants to encounter in a real-life laboratory.

Other such innovations include:

• **Parlez vous computer?** Jim Noblett, a professor of linguistics at Cornell University who is currently on a fellowship at the Institute for Academic Technology, uses the computer for language instruction, making the audio language lab seem primitive. To teach French, Noblett combined a bilingual dictionary with a word processor, creating Systeme D. "It is a learning tool that allows students to use language for creativity much earlier," he says.

Noblett added a tracking facility that shows the instructor the queries that students make to the bilingual database. "It gives us insight into what students think and how they learn languages," he says.

Most recently, he moved the software to the Microsoft Corp. Windows environment on a high-powered, Intel Corp. 80386-based PC, which allows him to add images and sound. Now Noblett is combining text and the bilingual database with images of the country and culture, as well as the authentic sound of native speakers. "It gives a complete context for listening to the language," he says.

• **Music to your ears.** Fred Hofstetter, who is the associate provost for academic computing and instruction technology at the University of Delaware in Newark, got into computers through music.

"When the videodisc was invented, it was a great way to study music," he says. Students could listen to the music and stop, start and replay sections while following the score on the screen.

Hofstetter didn't stop with just music courseware. Because he is called upon to give so many presentations, he developed Podium, a software product that allows a teacher to create an outline on a word processor and automatically translate it into a hypermedia script in which images, sounds, text and graphics are linked. "In the past, speakers were controlled by the slides. Now, each lecture is a new creation," he says.

For instance, if the student asks a question during a multimedia lecture prepared using Podium, the professor can type a frame number into the system and the desired image appears on the screen, even if the image was not used in the original presentation. A single videodisc stores up to 54,000 broadcast-quality slides.

• **Physics in action.** Edward F. Redish, professor of physics at the University of Maryland, says he worries that "students who come from high school see physics as a collection of unlinked facts. They miss the relationship of the parts and the underlying structure." To truly understand physics, the student "really must be active. Physics is not a spectator sport," Redish insists.

In an effort to involve students in physics, Redish is developing the Comprehensive Unified Physics Learning Environment, which combines material from a number of computer-based physics projects at three colleges — Michigan State, the University of Nebraska and Tufts University in Medford, Mass. — into one hypermedia system. It teaches through computer simulation, microcomputer-based laboratory work, interactive videodisc and

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery.

a physics education database.

• **Tell it like it is.** Computer technology is even revolutionizing the traditional lecture hall. At the University of Missouri in Rolla, students sit in the advanced technology classroom at desks equipped with an electronic response panel. The instructor, standing alongside a large projection screen, can present multimedia course materials and get instant feedback from students via the response panel — a new twist to the old surprise quiz.

The instructor at the podium can log onto any computer system on campus and execute any program, which is displayed on a large screen, explains Robert Davis, dean at the University of Missouri's School of Engineering.

For example, if the engineering department has an application running on the departmental LAN, the instructor can access that application, such as a spreadsheet, and run it for the class. The classroom was a joint project with IBM and has been in operation since October 1989.

• **But can it build a better mousetrap?** Davis, however, has taken academic computing beyond the classroom and applied it directly to the real world. The engineering school built a computer-integrated manufacturing (CIM) laboratory in which students can sit at a workstation, design something and, "if it meets the specification, manufacture it right there automatically, right through to packaging," he says.

The school is now developing a full-scale, industrial-strength version of the CIM lab for commercial manufacturing. Small companies that cannot afford the latest advanced automated manufacturing equipment will be able to buy time-sharing in the school's CIM facility. ◀

Radding is a free-lance writer based in Newton, Mass.

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Tips on how to get
the job you want

An interview survival guide

By Mary Scott

Do your homework. How often have you heard that admonition during your academic career? Yet I assure you, as a former director of systems recruitment at a major corporation and as someone who has interviewed thousands of college graduates, there is no better advice for preparing for — and surviving — an employment interview. For those in the information systems and electrical engineering disciplines, the process can hold special challenges.

How can you prepare yourself to shine during your interviews and invest your job search “homework” time wisely in the process? Here are some strategies to help you prepare:

- **Be honest with yourself.** Long before you embark on your first interview, you need to give serious thought to what type of position, environment and industry best match your skills, abilities, personal preferences and style. Rather than trying to force-fit your background into jobs you see posted in your campus placement office, first decide in which direction you want to go.

All your past work experiences — not just those in an IS environment — will give you important clues. What tasks did you enjoy? What do you want to avoid in a job? Do you work best as a member of a

team or alone? Do you learn better through on-the-job training, or do you expect a formal education program?

Next, think about your courses in college. Are your skills and interests highly technical, or do you prefer using technology to solve business problems? Are you intrigued by emerging technologies, or are the traditional languages and a mainframe environment more to your liking?

Develop an “ideal job” profile — a wish list of characteristics that are important to you in a position. You may not find a job that matches your preferences and expectations in every respect, but the self-awareness you’ll develop will enable you to determine what employment opportunities to pursue.

- **Identify those jobs that match your profile.** The next part of your homework assignment is to identify the types of careers your ideal profile matches and to research the industries and companies that sponsor these jobs. Information abounds in the placement office about the firms that plan to recruit on your campus as well as scores of other companies nationwide. Read company literature and job descriptions, but don’t place too much emphasis on job titles alone when conducting your search. “Systems analyst,”



HAL MAYFORTH

for example, does not mean the same thing at all companies. Focus on the job responsibilities described in company information and compare that information with your ideal job profile.

It may be helpful at this stage to talk with professors and any business contacts you have. Most professionals, on campus as well as in industry, are willing to spend time helping college students sort through the variety of available job options.

Company recruiters are spending more time educating faculty about career opportunities at their firms, so professors may be helpful in recommending companies that have the type of job you're seeking.

Attend information sessions and presentations that companies sponsor on campus. Develop a list of companies you'd like to pursue, based on what you've learned about them.

• **Prepare for the interview.** Having done the preparation work, it's time to focus on developing and polishing the skills you'll need to function effectively in the interview itself. Interviews have been called "a conversation with a purpose," and when conducted well, they should

meet the objectives of both interviewer and student.

For example, company representatives seek to determine how well candidates measure up to their selection criteria. Students have an opportunity to gauge how well positions meet their ideal job profiles and ask questions not addressed in company literature.

Bookstores and campus career centers are well stocked with books and videos on interviewing skills, although their quality tends to vary. Be wary of anyone who guarantees you'll get the job you want; there are too many variables in any interview situation to make such a promise. The value in these instructional devices comes when they tell about different types of interviews and questioning strategies. You should learn to recognize questioning strategies so you can respond appropriately when you're in the hot seat.

Take advantage of all these resources and services to master the mechanics of the interview process, but avoid developing a robotic "canned" presentation. Spend time with family and friends responding to the sample questions that are included in

interviewing skills texts, but don't over-rehearse your answers. Most interviewers are not impressed by a candidate who seems determined to recite a self-promotional speech regardless of the questions asked.

• **Recognize the interview and interviewer.** Although this is true of students in every academic discipline, my research shows that information systems and electrical engineering majors are more likely to experience special challenges during the interview process.

Here are the types of interviewers you're likely to encounter:

Personnel types: Many companies send professional recruiters to campus to conduct initial screening interviews, or else they require that you visit with a human resource representative to fill out necessary paperwork if your first interview is held at the company.

Although such recruiters are usually well informed about positions available and company benefits, they often lack any technical background. Your best approach in these initial interviews is to focus on the

Continued on page 50

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Continued from page 48

nontechnical skills the position requires and to help the recruiter see how you match the job overall. Describe any technical projects or work experience in general business terms and do not attempt to dazzle or intimidate recruiters with buzzwords; they won't understand you at best, and they may well resent your showing off.

Technical line managers: An increasing number of companies are sending systems and engineering professionals to campuses to conduct interviews, a development that is generally welcomed by students who know they can ask technical questions and receive knowledgeable answers. It is not unusual, however, to find that line managers have limited knowledge about the hardware and software you've used on campus.

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment — and to convince the managers that you possess the underlying logic skills and aptitude to learn their systems quickly.

Untrained interviewers: Although this may sound absurd, don't assume that the person conducting your interview has

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment.

been trained to do so or is even comfortable sitting across the desk from you. A disturbing number of companies — from major corporations to small high-tech firms — send staff to campus who have no idea what questions to ask or how to evaluate candidates. If you sense that this is the case, take the opportunity to summarize for the interviewer what your educational and work experiences have been and describe how you qualify for the position being offered.

I often ask recent graduates what they know now that they wish they had known

when they started their job search. The recurring theme I hear in research I conduct with college students and recent graduates is this: "The work load involved in finding a job is like carrying another course!"

Why bother investing the time to prepare? Although it's generally true that the demand for information systems and electrical engineering graduates is greater than the supply of candidates, that may not be the case for the specific jobs you choose to pursue. Doing your homework — determining what type of position you want, investigating appropriate companies and developing your interviewing skills — will give you an edge over your competition.

More importantly, it will give you the confidence to know you're well matched to the job and will provide you with the knowledge and skills not only to survive but to shine in your interview. ◀

Scott is president of M. E. Scott & Co., a college recruitment consulting and training firm based in West Hartford, Conn. She is former director of staffing at Aetna Life & Casualty.

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The envelope, please...

As IS execs compare pay stubs, jobs in the Big Apple and positions in securities get the big bucks

By David A. Ludlum

If you're a top information systems executive working in wholesale or retail trade in Arizona, congratulations. Your income is growing fast compared with the salaries of your colleagues in other industries. Factor in your low cost of living, and the numbers look even better.

When it comes to compensation, some IS professionals are gaining ground at a faster clip than others, according to *Computerworld's* fourth annual salary survey.

The variations do not just reflect industry conditions and geography. Compensation is rising faster for some positions than for others across the board. This year, pay for IS managers or supervisors reporting to the top IS executive is up 14% from the level reported last year. Meanwhile, compensation for communications specialists and database analysts has risen only 3%.

The more than 1,500 IS organizations responding to the survey report an average departmentwide salary increase of 5.7% for this year. That compares with nationwide increases of 5.7% for all executives and 5.4% for all salaried employees, according to William M. Mercer, Inc., a compensation consulting firm in Deerfield, Ill. Meanwhile, the U.S. government's consumer price index has risen 5.8% through July of this year.

Senior systems analysts, senior programmer/analysts and

senior operating systems programmers also registered big gains since last year's survey, with compensation up about 10%. Laggards include database managers and administrators; they gained only 4%.

During the four years *Computerworld* has conducted its survey, top IS executives' salaries have jumped the most, rising 15.5%. Senior systems analysts and senior programmer/analysts have done well over the four years, too, along with systems and programming managers. Data center shift supervisors, communications managers and senior programmers have chalked up the smallest overall gains.

With the great value IS organizations now place on business knowledge and interpersonal skills, "pure" programmers tend to get salary increases that just keep up with the cost of living, says Richard Wonder, national director of the IS division at recruiting firm Robert Half International, Inc. Meanwhile, systems analysts — and programmers with the analytical skills expected of systems analysts — make more money.

"As time goes on, there'll be less need for pure back-room coders, because the trend in IS is toward end-user computing, decentralization and people who have business and technical skills," Wonder says.

The average salary for information center managers rose slightly this year, but it remains nearly \$1,600 below its 1987 level. Recruiters attribute

AVERAGE SALARIES AND BONUSES

	Average annual salary	Average additional compensation	Average total compensation	Average years of IS experience
IS MANAGEMENT				
CIO/VP/Director of IS	\$68,690	\$8,581	\$75,611	16.0
IS manager/Supervisor	\$55,236	\$4,734	\$58,843	13.0
END-USER SUPPORT				
Manager, end-user computing	\$47,601	\$2,608	\$49,463	10.1
Information center manager	\$45,179	\$2,650	\$47,100	10.2
LAN manager	\$39,970	\$1,999	\$41,177	6.6
PC specialist	\$32,321	\$1,451	\$33,306	5.1
COMMUNICATIONS				
Network manager	\$48,658	\$2,702	\$50,493	10.0
Telecommunications manager	\$48,611	\$2,749	\$50,578	10.6
Communications specialist	\$37,271	\$1,445	\$38,231	7.7
SYSTEMS AND PROGRAMMING				
Systems and programming manager	\$53,549	\$3,630	\$56,159	12.9
Project manager	\$49,345	\$2,246	\$50,852	10.8
Senior systems analyst	\$44,569	\$1,788	\$45,669	10.4
Systems analyst	\$38,525	\$1,782	\$39,617	7.4
Senior programmer/Analyst	\$39,656	\$1,696	\$40,754	8.9
Programmer/Analyst	\$33,819	\$1,306	\$34,659	5.5
Senior programmer	\$33,911	\$1,105	\$34,631	6.5
Programmer	\$27,581	\$1,125	\$28,312	3.2
TECHNICAL SERVICES AND OPERATIONS				
Technical services manager	\$53,544	\$3,174	\$55,799	13.0
Senior operating systems programmer	\$47,059	\$1,323	\$47,886	11.2
Operating systems programmer	\$39,355	\$1,301	\$40,196	7.3
Data center or operations manager	\$41,527	\$2,005	\$42,878	12.1
Data center shift supervisor	\$30,184	\$1,197	\$30,926	8.5
DATA SERVICES				
Database manager/Administrator	\$49,384	\$2,193	\$50,938	10.5
Database analyst	\$41,594	\$1,489	\$42,561	8.0

the declines to a downgrading of the position; as information center managers moved on, they were succeeded by less experienced people.

This year's survey finds top IS executives earning a total compensation of \$75,600 — a fraction of what IS chiefs at the biggest firms in the most competitive job markets make. However, it is a significant outlay for the survey's cross-section of small to large firms across the U.S. "In a lot of communities, someone making \$70,000 is one of the wealthiest people," says Skip Tolette, an executive recruiter at Schmitt Bishop Tolette.

The organizations responding to the survey report average revenues or assets of \$864 million. However, for three-fourths of the companies, that total is less than \$500 million. At the largest companies, the compensation for top IS executives is 38% greater than the overall average.

The really big bucks in IS go to a smaller group of highly visible executives. Jay Gaines, a New York executive recruiter, likens the arrangement to Hollywood's star system. "There's an awful lot of dollars chasing a handful of people," he says. "I think you have 50 top guys in the country who are on everybody's hit list." Only about 20 of them command pay of \$750,000 or more, Gaines says. Individuals at Wall Street's major investment banking firms lead the list.

BIG APPLE, BIG BUCKS

This year's survey again finds top IS executives in New York making more money than their colleagues in other locations. New Yorkers hold a 25% lead over their

Systems analysts — and programmers with the analytical and interpersonal skills expected of systems analysts — make more money.

counterparts in Boston, home to top IS executives with the second biggest paychecks.

The jobs in New York pay a healthy premium even after compensating for the high cost of living there. One reason: There's a lot of competition for the best IS talent in New York. Another reason is that people demand a premium for working there. "It's a tougher place to get people to move to," Tolette says.

The regional ranking of pay for top IS executives does change when adjusted for variations in the cost of living. The Phoenix/Tucson area moves up the most after the adjustment — from seventh place to fourth. There's a strong demand for computer professionals in Arizona because the region has attracted a lot of software companies in recent years, says Dick Minogue, director of U.S. cost-of-living services at Associates for International Research, Inc., a compensation consulting firm in Cambridge, Mass.

The regional variations in pay for top IS executives apply to smaller companies

more than big corporations, recruiters say. Bigger corporations in the outlying regions compete with companies in large cities for top IS executives, so they have to pay as much as those companies do.

Since last year's survey, top IS executives in wholesale and retail trade have bettered their lot compared with their colleagues in other industries. In 1989, the pay for CIOs and vice-presidents of IS was lower in that industry than in all other fields except education and government. This year's survey puts top IS executives in wholesale and retail trade in fourth place — ahead of their counterparts in insurance, manufacturing and health care.

Firms in wholesale and retail trade have been turning to information technology to handle crucial functions such as automating inventory control, says Bob Lemke, a consultant at the William M. Mercer office in Chicago. "They're having to buy talent to catch up to the changes other industries have already made," he says.

Meanwhile, compensation in industries that have traditionally paid the most for IS talent are steady or dropping when bonuses are taken into account, recruiters say.

The big spender image of financial services also looks less certain when one looks at stock options, Gaines says. The options tend to be less valuable at service companies than in manufacturing concerns, where they can be worth \$100,000 or more for top-paying IS positions.

Programmers and analysts do not typically get stock options, but there is growing interest in paying them overtime for extra work, Lemke says. "I think the trend is to pay more straight-time overtime rather than comp time," he says.

Experience in hot technical areas can also add to pay for programmers and analysts. According to Steve Joffe, a vice-president at recruiting firm Source Services Corp. in Paramus, N.J., the hot areas in applications development today include mainframe, on-line database systems, especially using IBM's DB2; midrange systems using IBM's RPG III language or Digital Equipment Corp.'s VAX/VMS operating system; and personal computer systems incorporating relational databases and local-area networks, as well as Unix, C or Windows.

Ludlum is a former *Computerworld* senior writer.

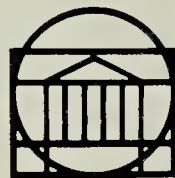
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Some walls are higher than others

Lack of understanding, recognition sometimes mars overall contentment in IS

By David A. Ludlum

The Berlin Wall has fallen, and countries in Europe are opening their borders to one another. But here in the U.S., information systems people still suffer from a feeling of isolation.

Overall, IS people are more than happy with their calling, according to *Computerworld's* fourth annual job satisfaction survey. However, when there is discontent, IS vice-presidents and programmers say, it is often because top managers and computer users do not understand the complexities of IS work or appreciate its importance.

A little more than half the people responding to the survey say they're satisfied or very satisfied with their current positions. Another quarter say they're somewhat satisfied with them.

Overall, the respondents agree that IS is an exciting profession, albeit a high-pressure one. Ask them what they like

most about being in IS, and they're likely to say challenge, followed by technology and variety (see chart at right).

One big challenge is watching costs. IS people need to squeeze more out of old systems and make sure that new technologies are cost-effective, says Hannah Foster, senior vice-president of IS at The Coast Distribution, a distributor of parts for boats and recreational vehicles in San Jose, Calif.

Although costs of certain technologies are falling, the expense of specialized IS training is growing, she says.

Technology has moved up on the list of things the respondents like about their profession: It is the No. 2 choice in this year's survey, up from No. 4 last year.

During the last few years, there has been a lull in exciting new technologies, according to Michael Sepe, IS manager at Irvine Ranch Water District in Irvine, Calif. Today, technologies such as imaging and opti-

cal storage promise to create new ways of doing business, he says.

What the respondents liked least about their profession is related to problems with man-

agement and end users: poor communication, a lack of understanding and recognition of IS work and users' demands, complaints and mistakes.

The messages that the

Two-edged sword

Change turns up as both a blessing and a curse when IS people list the things they like most and least about their work



What do you like the most?

1. Challenge

"We want to maximize and optimize the use of existing systems, not just change because there's something newer or better."

HANNAH FOSTER
SENIOR VICE-PRESIDENT FOR IS
THE COAST DISTRIBUTION

2. Technology

3. Variety

4. Constant change

5. Problem-solving



What do you like the least?

1. Communication

(Lack of communication with or recognition by management)

"Top managers don't communicate effectively what they want technology to do for them. If you allow them to be vague, that's all they are going to do."

LARRY DAVIS
MIS OPERATING OFFICER
SERVICE STAR CORP.

2. End-user mistakes and demands

3. Stress/Pressure/Burnout

4. Long or odd hours

5. Ever-changing business and technology Unrealistic deadlines (tie)

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3. Variety of responsibilities	3.13*
4. Success of the company	2.94*
5. Opportunity for advancement	3.23*



*On a scale of 1 to 4: 1 is very dissatisfied and 4 is very satisfied.

respondents would most like to pass on to top management are to improve communications, interaction and teamwork and to give IS people more recognition and involvement in decision-making.

"Improve communication" is the message from Larry Davis, MIS operating officer at Service Star Corp., a hardware, lumber and building materials wholesaler in Butler, Pa. His organization has created a customer information system that he says has far-reaching implications, but management needs to convince employees to change their ways and use it. "Its usage is optional until we get effective communication from top management that it shouldn't be optional," Davis says.

Managers continue to be frustrated by senior executives who don't understand technology. Gerard E. Tarpey, associate director of management and computer in-

formation systems at Pace University in New York, says he wishes that top managers knew enough about technology to understand when it's time to upgrade equipment. "It's like pulling teeth to get the OK for added horsepower," he says.

That lack of understanding can trickle down in an organization. IS professionals complain that some computer users don't understand how difficult it can be to create information systems. "It's not just a matter of flipping a switch and getting a report out," says James Evans, a senior programmer and analyst at Systematics, Inc., a facilities management company based in Little Rock, Ark.

Foster is troubled by a more general lack of understanding of IS, particularly the perception that IS organizations are somehow different and that IS people are "techno-nerds." IS people usually possess

a clear understanding of business needs, she says.

Users and top managers also fail to appreciate the significance of IS work, survey respondents say. In developing systems, IS people create a "hidden infrastructure" and change the way business is conducted throughout an enterprise, says Mike Whaley, MIS/DP manager at Job Opportunities, a nonprofit job training agency in Reno, Nev.

"There are a lot of things you tailor, and therefore, you subtly change the way decisions are made," Whaley says. Training people to use computers also makes an impact on the enterprise that most people don't appreciate, he says.

STRUCTURALLY FRUSTRATED

These misperceptions, misunderstandings and tensions can leave IS people frustrated. When asked about their biggest frustration, slightly more than half of the respondents point to office politics. As IS organizations gain clout within their enterprise, people in other areas can view the changes as empire building, Sepe says.

The IS organization at Irvine Ranch Water District is taking charge of telemetry systems used for remote control of water supplies — an area that had been the bailiwick of an engineering group. That change has created turf battles. "Engineering people say, 'You guys print paychecks. What do you know about telemetry?'" Sepe says.

Evans is also frustrated by politics. He recalls a client of his company ousting an IS consulting firm — wrongly, he says — after the consulting firm had cut back on the role of some IS executives. Those executives had the political clout to fight back.

One way of gaining political clout is to move into the executive suite. But three-fourths of the respondents to the survey say their company's IS department does not provide the right opportunities to advance to non-IS management positions.

An alternative to the move to a non-IS management position is to change jobs. Almost one-third of the respondents say they are always looking for job opportunities. One-fifth of middle managers also have an eye out for opportunities, compared with 16% of senior executives and 31% of IS professionals. ◀

Ludlum is a former *Computerworld* senior writer.

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Graphic: Magnetic fields surrounding components in a Motorola transceiver are captured using advanced imaging technology.



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INTERGRAPH

Top IS Users Soar Above Tough Times

By Michael L. Sullivan-Trainor and Joseph Maglitta

Gone are the days when information systems could hide in the back office, sheltered from the turbulent winds of corporate change. As technology plays a greater role in determining company success, information systems professionals are facing the same challenges as their peers in other front-line departments.

Nothing illustrates this shift more clearly than *Computerworld's* 1990 Premier 100 rankings. Each of the qualifying companies exemplifies the new role of IS.

Now, rather than focusing only on the latest IBM announcement, *Premier 100* executives are grappling with the various challenges of their industries. Financial services firms such as Paine Webber, Inc. are struggling with Wall Street's woes. Defense contractors such as General Dynamics Corp. are anticipating large reductions in their government business. Retailers such as Sears, Roebuck and Co. are battling reduced consumer spending. All the companies on the list are battenning down the hatches for the looming recession.

However, the biggest factor that causes these companies to rise above various business booby traps is their continued commitment to IS — despite corporate performance dips and anxiety about the future. Not coincidentally, faith in IS corresponds closely to a company's ability to remain profitable despite tough times.

For example, MCI Communications Corp. — the only company to rank in the *Premier 100* Top 10 three years in a row — repeats its first-place ranking in 1990 with a 61% increase in profitability from 1988 to 1989 and a 40% increase in its IS budget (from \$285 million to \$400 million). These achievements are the products of continued victories in the organization's competi-

tive battles with its long-distance service rivals as well as expansion and strategic alliances.

FMC Corp. rockets to second place this year with a \$110 million IS budget (an increase of 10%) and significant investments in new equipment. For example, IS spending in the company's agricultural chemicals group has increased 200% in the past three years. During that time, three plants were upgraded on the industrial chemicals side of the business, along with investments in computer systems for sales and marketing. At

the same time, the company's profitability increased 21% from 1988 to 1989. All these events occurred at a time of aggressive competition in the chemicals industry and threatened defense cutbacks, which could affect half the company's business.

American Airlines and its parent, AMR Corp., continue to wing along atop the transportation industry. The company reduced its billion-dollar IS spending by less than 1% while maintaining its commitment to Sabre and planning a major downscaling of the massive computer reservations system. Profit for AMR was also down 5%, contributing to its slippage in rank to fourth overall.

Other companies continue to be committed to technology despite profit problems — a tribute to the IS executive's ability to support the technology program in difficult weather. Sears vaulted to 12th place in 1990 on the strength of a 20% budget increase and profit growth of 3.8%. Yet the \$54 billion giant is struggling in 1990, and cost-reduction pressure is mounting. Nevertheless, a strong management commitment to technology continues and may help pull the company back into the limelight.

Bankers Trust New York Corp. is riding a roller-



coaster earnings cycle. The volatility of South American loans made it No. 1 in profit growth in 1988 and dealt the company a loss in 1989. However, the bank's commitment to IS remains unswerving.

Overall, the *Premier 100* Top 10 increased spending by an average of 8%, or 5.4% of their total revenue, down 0.2% from last year's Top 10. Investments in current computer systems increased by an average of 6%, but the ratio to revenue actually decreased by 0.2%. Investments in personnel also decreased by an average of 5%, and training expenditures remained

about even. The growth area is personal computers and terminals, which increased by an average of 12%.

As significant as the statistics are, the way these investments are applied makes the difference between *Premier 100* winners and the rest. One key ingredient to a recipe for IS effectiveness is the ability to carry out a unified vision of where technology integrates with business requirements.

For example, MCI is successful because its IS investments are intrinsic to the development and growth of its network, which is the single most important element

in the company's arsenal.

As important as insight into systems applications are the tools to carry out the functions. All of the top companies employ current technology to get the job done, but some stand out more than others.

Merck and Co.'s Albert Cinorre, vice-president of computer resources, oversees an IS budget of \$185 million. Traditionally a Wang Laboratories, Inc. shop, Merck has turned to the latest IBM systems to speed drug development, particularly in the area of molecular modeling.

Such investments in the latest systems

THE 100 MOST EFFECTIVE USERS OF INFORMATION SYSTEMS

1	MCI Communications Corp.	35	Caterpillar, Inc.	69	Rockwell International Corp.
2	FMC Corp.	36	Salomon, Inc.	70	Freeport-McMoran, Inc.
3	Bankers Trust New York Corp.	37	Monsanto Co.	71	The Travelers Corp.
4	AMR Corp.	38	Merck & Co.	72	McGraw-Hill, Inc.
5	Union Texas Petroleum Holdings, Inc.	39	Contel Corp.	73	Amax, Inc.
6	General Dynamics Corp.	40	Bankamerica Corp.	74	AT&T
7	Paine Webber, Inc.	41	Grumman Corp.	75	The Penn Central Corp.
8	Norwest Corp.	42	Polaroid Corp.	76	J. P. Morgan & Co.
9	Banc One Corp.	43	The Timken Co.	77	Lockheed Corp.
10	Gencorp, Inc.	44	General Re Corp.	78	Sun Co.
11	The Dun & Bradstreet Corp.	45	Northeast Utilities	79	Abbott Laboratories
12	Sears, Roebuck and Co.	46	The B. F. Goodrich Co.	80	Ambase Corp.
13	Gillette Co.	47	Centerior Energy Corp.	81	National City Corp.
14	Chicago & North Western Transportation Co.	48	The Mead Corp.	82	Duke Power Co.
15	Signet Banking Corp.	49	The Boeing Co.	83	Becton, Dickinson & Co.
16	Martin Marietta Corp.	50	Baxter International, Inc.	84	Mutual Benefit Life Insurance Co.
17	Security Pacific Corp.	51	Northrop Corp.	85	Xerox Corp.
18	United Telecommunications, Inc.	52	Rohm & Haas Co.	86	Louisiana Land & Exploration Co.
19	Corestates Financial Corp.	53	Massachusetts Mutual Life Insurance Co.	87	Carter Hawley Hale Stores, Inc.
20	The Dow Chemical Corp.	54	New York Life Insurance Co.	88	Colgate-Palmolive Co.
21	GTE Corp.	55	CSX Corp.	89	Aluminum Co. of America
22	Bell Atlantic Corp.	56	Wells Fargo & Co.	90	Valhi, Inc.
23	Ameritech Applied Technologies	57	The Prudential Insurance Co. of America	91	Inland Steel Industries, Inc.
24	Allied-Signal, Inc.	58	Primerica Corp.	92	Eli Lilly & Co.
25	Air Products and Chemicals, Inc.	59	United Technologies Corp.	93	Merrill Lynch & Co.
26	American Express Co.	60	The Pittston Co.	94	The Mutual Life Insurance Co. of New York
27	US West	61	Ingersoll-Rand Co.	95	J. C. Penney Co.
28	Federal Express Corp.	62	Union Carbide Corp.	96	Enron Corp.
29	Southwestern Bell Corp.	63	Metropolitan Life Insurance Co.	97	Shawmut National Corp.
30	3M Co.	64	TRW, Inc.	98	Northwestern Mutual Life Insurance Co.
31	Atlantic Richfield Co.	65	McDonnell Douglas Corp.	99	The Aetna Life & Casualty Co.
32	Oryx Energy Co.	66	Textron, Inc.	100	Jostens, Inc.
33	Phillips Petroleum Co.	67	Quantum Chemical Corp.		
34	Pacific Mutual Life Insurance Co.	68	Mobil Corp.		

must be tempered today with a keen awareness of budget constraints. Cost efficiency is a major theme among the most effective users of IS. At FMC, for example, systems are purchased at the beginning of their cycle below peak costs and are jettisoned before their value expires. But more than that, a system will not cross the threshold of the organization's computer center without a proven business requirement.

Other firms emphasize process and integration with the company culture as subtler ways to fashion effective IS groups. General Dynamics focuses on total quality management, where less than 100% quality is unacceptable. Such concentration speeds application development by involving more user participation and embeds the philosophy of doing it right the first time into the organization's culture.

Last but still key is an emphasis on the people who run the IS operations. Companies such as Paine Webber and Union Texas Petroleum Holdings, Inc. empower those involved in IS — both users and technical specialists — by giving them control over their work and exposure to both technical and business requirements. In fact, Paine Webber recently fired 71 outside consultants and entrusted their projects to internal staff to cut costs and show faith in the staff at the same time.

The *Premier 100* also tells the story of companies that, despite strong efforts, find it difficult to keep up with the high fliers in the choppy IS stratosphere. Among these are Baxter International, Inc., which fell from the lofty position of eighth overall and No. 1 in manufacturing last year to 50th this year because of significant downsizing and restructuring, leading to a \$50 million reduction in the IS budget. Michael Heschel, Baxter's IS chief, moved over to head IS at Security Pacific Corp.

Modest increases in spending and profit at Dow Chemical Co., another industry winner last year, caused it to be passed by other fast-rising companies. The company relocated five spots lower on the list, with continued data center consolidations as the major activity.

Lockheed Corp. toppled down on the list because of a large reduction in profit accompanied by changes caused by a restructuring of the aeronautical group, shutting down operations in California and consolidating in Georgia.

Other companies, such as Northeast Utilities, which captured the top rank overall in 1988, simply failed to keep up

Opting for a lean, mean IS machine



eaner, more supple and closer to the action is how firms want their IS organizations, IS executives say.

Rather than centralizing or decentralizing, executives report that their organizations are crafting new, hybrid structures combining both forms. In fact, a survey of 92 companies reveals that more than half (56) are now operating "mixed" IS organizations. Another 24 retain centralized structures, while 12 are fully decentralized.

Proponents of mixed structures include: FMC Corp., General Dynamics Corp., Abbott Laboratories, Aluminum Co. of America and Pacific Mutual Life Insurance Co. Centralization is favored by Paine Webber, Inc., The Travelers Corp. and Signet Banking Corp. Among the larger decentralized companies are American Express Co., Gencorp, Inc. and United Technologies Corp.

According to IS managers, the new hybrid structures let organizations take advantage of local access to technology while still providing overall guidance for systems efforts from the central organization.

An important related development is the fast-growing popularity of data center consolidation as a cost-cutting measure. All told, 43 of the companies report that they have merged or consolidated data centers during the last year. Another 27 expect to do so in the coming year.

Typical among consolidators is Edwin Sherin, senior vice-president of IS at Primerica Corp., who reports: "We will continue to implement a data center consolidation effort, which will yield significant expense savings."

Ameritech reports data center consolidations from 14 to four during a five-year period.

Consolidation is popular among aerospace firms, which are also restructuring and downsizing in anticipation of federal defense budget cutbacks.

MICHAEL L. SULLIVAN-TRAINOR AND JOSEPH MAGLITTA

with the pack. Modest budget and value increases of less than 2% and personal computer and terminal boosts of less than 10% coupled with a 10% profit drop caused the company to fall further down the list.

All the ups and downs of life at the top of IS evidenced by the *Computerworld Premier*

100 show the battle scars of the 1990s. And to think it's only the beginning of the decade. ◀

Sullivan-Trainor and Maglitta are *Computerworld* senior editors.

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Fashioning systems for the future

**Levi Strauss' Rund designs readiness for change
into world's largest apparel firm's IS**

By Jean S. Bozman

The art of managing information systems starts with the task of designing them well. That is the thesis of Donna Rund, vice-president of information engineering at Levi Strauss & Co., who believes that thinking about computer-aided software engineering (CASE) is just as important as having programmers crank out lines of code.

To illustrate her point, Rund draws pictures of her business model of San Francisco-based Levi Strauss. It is a functional representation of intersecting circles, matching all the business units to the systems that support them. It is really a blueprint of the underpinnings of the world's largest apparel company. With annual revenue of \$3.6 billion, Levi Strauss operates on four continents and distributes its products around the world.

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself," she says, sitting in her brick-walled office overlooking San Francisco Bay. "Our challenge in the '90s is to focus on *what* you do in DP, not on how you do it."

PEOPLE SKILLS

The very nature of IS is changing, and the people who work at information engineering, as Rund calls it, must change their job descriptions. "We're moving our people to be designers and systems integrators," she says. "There's still a need for technicians. But we're going to have a merging of skill sets between IS and the end user. People skills — like the ability to negotiate, facilitate and elaborate — will make our people into knowledge workers."

Those workers have to be able to extract systems requirements from business unit managers who have never programmed a personal computer. They have to be able to listen — and to travel, if necessary — to where the business units are located.

They also have to build systems in a modular fashion so that, in Rund's words, "applications development products can be popped in and out without affecting the overall systems design." They can no longer afford to be cloistered technicians, toiling away in isolation, she adds.

For example, Rund envisions that applications written for an IBM 3090 mainframe at headquarters will one day be transferable to IBM Application System/400s at Levi Strauss factory sites



CINDY CHARLES

RUND WANTS Levi Strauss' staff to gain business skills, develop flexible systems

around the world. Levi Strauss is currently using Knowledgeware, Inc.'s Information Engineering Workbench as the basis for its CASE design.

"Beyond that, the challenge will be to manage applications as the business changes," Rund says. One way to do that, she says, will be to issue new application "releases" in much the same way that software vendors do.

ADAPTABLE ATTITUDE

Her statements are in sync with the evolving management philosophy at Levi Strauss, which has recently undergone a leveraged buyout and drastic downsizing in an effort to stay competitive.

The watchword at the firm is flexibility, as IS planners employ electronic data interchange, IBM mainframes and relational databases to keep pace with other clothing manufacturers in Europe and the Far East.

"We are shifting the corporate asset from being the application code to being the design [of that application], which has lasting value," says Bill Eaton, chief information officer at Levi Strauss. "The

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself."

Donna Rund
Vice-President of IS
Levi Strauss & Co.

specific products you use to write that code are not as important."

Rund, Eaton says, practices enterprise modeling. "In the information engineering area, Donna is providing the vision of the kind of systems we want to build: flexible, durable and responsive to changes in the technology environment," he says. "She is the glue that holds all of that together."

Today, Levi Strauss' worldwide IS staff numbers just 400, with about 325 in San Francisco and the rest supporting business units in Tokyo, Toronto and Brussels. "We've cut out many management layers so that it's really a very, very flat organization," says Bob Mann, director of applied information technology. Mann manages Levi Strauss' CASE strategy and works closely with Rund on data design issues.

GO TEAM!

To make that flattened organization work, Rund and the other 13 IS managers reporting to Eaton have to work on motivating their staff to act as a team. "Donna has a lot of energy," Mann says. "She's able to get a lot of buy-in across [information resources] rather than vertically. Flattening the organization only works if people feel empowered, if they feel they are creating part of the destiny of Levi Strauss." That feeling is enhanced by an employee stock ownership plan that was established after the buyout in the mid-1980s.

Rund, who was named to her current

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position 2½ years ago, has been at Levi Strauss since 1980. Previously, she worked at several large banks and insurance companies as a software manager. In her off hours, she trains and shows horses. "It's like teaching a horse ballet, when you do it right," she says.

Rund wants IS workers to get out of the office occasionally so they can step back from their programming and concentrate on the larger issues of information architecture. "We've had two-day off-sites in which we discussed the role of a manager and what it will be like in the future," she says. "Systems analysts will be working in the user environment. And with the new technology that's coming along, you won't have to be a programmer to design a system."

HIGH ASPIRATIONS

Rund's IS leadership sessions complement those of the rest of the company, which has a 2-year-old "Aspirations" program handcrafted by top management. The Aspirations mission statement, endorsed by Chief Executive Officer Robert Haas, lists six key management touch-

The very nature of IS is changing, and the people who work at information engineering must change their job descriptions.

stones: new behaviors, diversity, recognition, ethical management practices, communication and empowerment.

The atmosphere at the Levi Strauss Plaza headquarters, along San Francisco's Embarcadero waterfront area, is relaxed. There is modern art on the walls, and attire is casual — often Levi Strauss jeans or jackets, in fact. Programmers work on IBM DB2 applications during the day and sit by the plaza fountain or sip a cup of cappuccino at a nearby cafe at lunch.

The same messages are brought home at periodic off-site leadership weeks led by top Levi Strauss managers. In

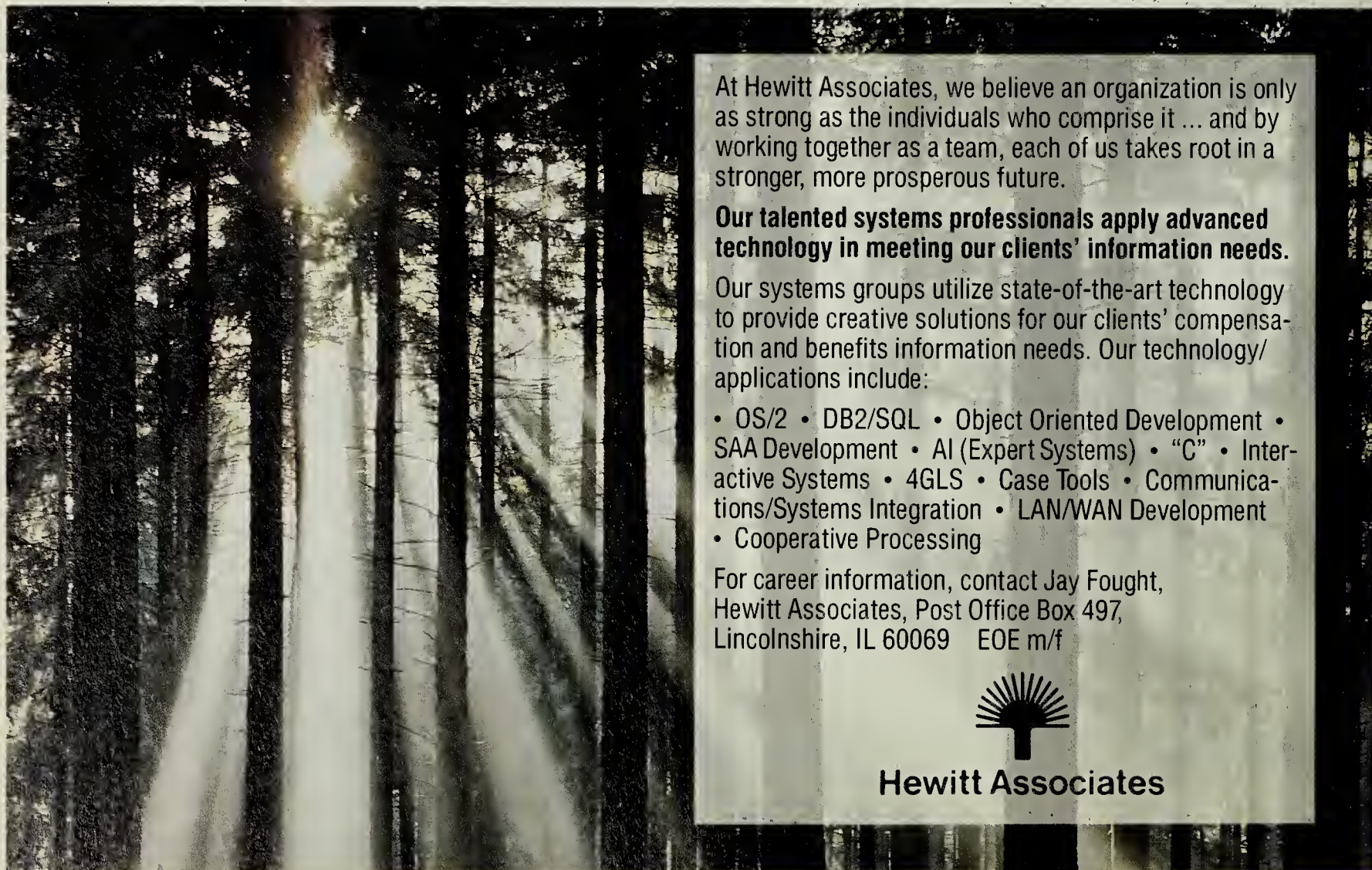
June, Rund took her turn leading a week-long off-site session in Santa Cruz, Calif. "Our off-sites are moving us ahead," says Hank Ahlgrim, manager of database administration.

"Our management has made it very clear to us that if you're not activating creativity and empowerment, if you're not pushing authority and responsibility to those nearest the action, you won't survive in the 1990s," he adds.

In the end, Rund says, it is the people of Levi Strauss' IS group that will enable the overall business plan — or slow it down. "It doesn't matter which hardware we're on or which telecommunications gear we have as long as that gear doesn't get in the way of moving the company forward," she says. "You have to have a vision of where you want to go and start working your way toward that vision. What we've been doing is learning how to adjust our internal business processes to a brand-new world."

Bozman is *Computerworld's* senior West Coast editor.

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Experiencing life at the top

**Merrill Lynch's Peterson earned his way
into top management's inner sanctum**

By Amy Cortese

Tracking Merrill Lynch & Co.'s minute-to-minute stock performance on a personal computer in his corner office overlooking Manhattan's financial district, DuWayne Peterson does not look like your average information systems chief. Indeed, he is not.

Known as the million-dollar man because of his seven-figure salary [CW, Jan. 15], Peterson has accomplished what many IS executives are still striving for — entry into top management's inner circle.

"You couldn't be in a better position" in this industry, acknowledges the 58-year-old Peterson. But he stresses that his job goes beyond that of the typical IS chief.

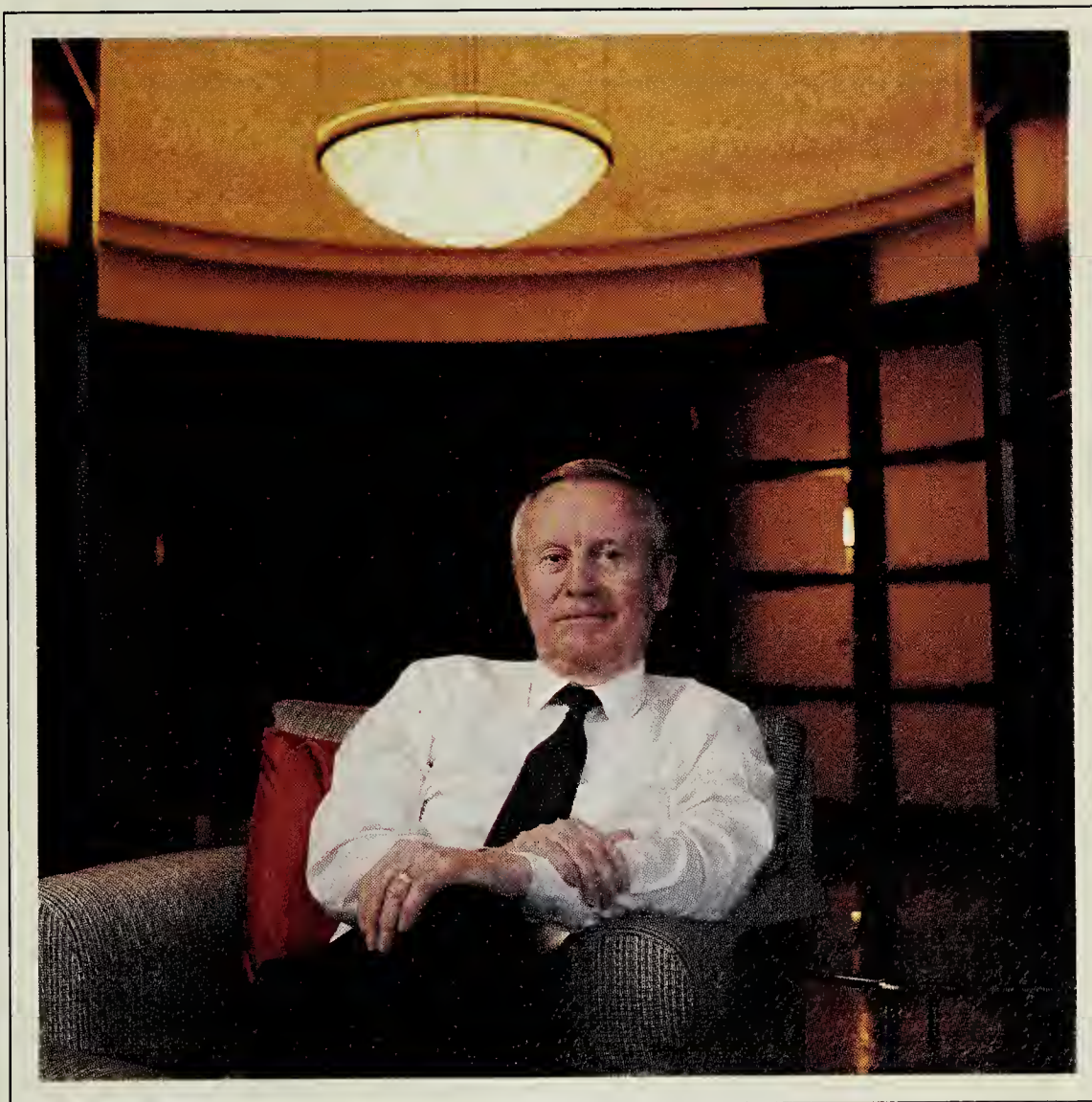
As executive vice-president of operations/systems and telecommunications at the nation's largest retail brokerage house, Peterson oversees 12,000 employees and a budget of just over \$1 billion.

As testament to his important role at Merrill Lynch, he is an *ex officio* member of the executive committee, along with the chairman, president and a handful of other executive vice-presidents.

Peterson seems to have the right balance of technical and business savvy, colleagues say.

"DuWayne is very much a senior business executive at the top of the organization. With a firm like Merrill Lynch, that's what you need," says Bruce Turkstra, Merrill Lynch's senior vice-president of global IS.

"He has good political sense and social sense," adds Gerry Eli, director of



ANDY FREEBERG

THE MILLION-DOLLAR MAN seeks to control costs and deploy cutting-edge technology

global IS. "He fits right in with upper management."

Peterson cites three success factors for aspiring IS executives: a solid track record of performance, good communication skills and the ability to translate technology into business terms. "The key is establishing credibility with management," he says. "The compliment I always get is that I make it sound so easy. You have to take the mystery out of it."

An only child born in Evanston, Ill.,

Peterson spent most of his youth in the Detroit area. His career has taken him from Detroit to California to New York, where he and his wife now reside in an Upper East Side co-op. An avid skier, tennis player and golfer, Peterson manages to return to his Los Angeles-area home a few times a year to pursue those interests.

After graduating from MIT and serving a brief stint as a civil engineer corps officer in the U.S. Navy, Peterson joined Honeywell, Inc.'s temperature

control business in Detroit, as his father had done. When Honeywell started getting involved with computers in the 1960s, Peterson was intrigued and returned to school with plans to get into the dawning industry.

Armed with an MBA from the University of California at Berkeley, Peterson went back to Detroit to work in IS at Ford Motor Co., modernizing the company's operations and product development systems.

Since then, Peterson has served distinguished terms at Citicorp, RCA Corp. and, most recently, Security Pacific Corp., where he was executive vice-president of the bank's Automated Data Processing Group for several years.

Peterson came to Merrill Lynch in 1986. "There's been a lot of change since he's been here," Eli says, noting that the IS budget and staff have declined, and the group is more control-conscious.

As Wall Street continues to undergo brokerage industry contractions, Merrill Lynch has been one of the hardest-hit firms because of its freewheeling expansion during the boom years of the 1980s.

"DuWayne has a unique ability to let his people show initiative while establishing a vision."

**Bruce Turkstra
Merrill Lynch**

Peterson's charter has been to control costs while deploying technology to Merrill Lynch's strategic advantage.

In light of layoffs and budget cuts, some might resent Peterson's large salary, but colleagues defend it. "He deserves every penny of it. He's added 10 to 100 times more than that to the firm," Turkstra says.

Peterson says that his status gets him "a lot of notoriety," but colleagues describe him as first and foremost a family man. No doubt he has helped inspire two of his three children to become involved in the computer business: One is in telecom-

munications at Procter & Gamble Co., and another works in the computer center at Pacific Bell.

Peterson's management philosophy? "I like to hire the best people I can get my hands on, give them the authority and the tools they need to get the job done, then let them have some fun," he says.

Subordinates agree. "DuWayne has a unique ability to let his people show initiative while establishing a vision," Turkstra says.

Eli characterizes Peterson's informal, entrepreneurial style as "more California. He sets goals and expects everyone to live up to expectations."

Where do you go from the top? Peterson says he will finish out his working life at Merrill Lynch.

"I'd like to retire eventually, maybe do some consulting," he says. But when that time comes, he says, "you stop and take stock of your life. This business moves so fast."

Cortese is a former Computerworld Mid-Atlantic correspondent.

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Delivering data to the deal makers

Warner's Winski has the communications tools

for life in the entertainment fast lane

By Clinton Wilder

Last year was the year of *Batman*, the Rolling Stones tour and the blockbuster \$13 billion merger of Warner Communications, Inc. with Time, Inc. It showed, more than ever, that the entertainment industry is driven by big hits, big bucks and big deals.

Information systems plays an increasingly important role in the fast-moving world of movie moguls and millionaire rock musicians. But Don Winski, executive director of corporate information services at Warner, knows that strategic systems are sometimes no substitute for power lunches or conference calls on car phones.

"Information is not just what's on a computer screen or on paper," Winski says. "Voice is information and is usually more important in closing a deal than classic hard data. It's hard to predict when a deal will click, but we [in IS] have to be ready."

Winski's personal accessibility is evident in his strong handshake, hearty laugh and the pile of comic books on his office coffee table. His speech flows quickly with a slight tinge of his Brooklyn birthplace, a style that he likes to call "a New York corporate accent."

Originally trained as a chemical engineer, Winski moved into operations research and has had a varied computer technology career with stints as a consultant, entrepreneur and IS executive. He and those who know him agree his business background is essential for success in the entertainment industry's fast lane, particularly in a culture led by deal-mak-

ing Steven Ross, Warner's chairman.

"It's a tough, take-no-prisoners business," says Jerry Mayfield, a principal at the DMW Group, a telecommunications consultancy that has worked closely with Warner. "Most guys would last about 15 microseconds in a job like that unless they can communicate at the business level."

Mayfield describes Winski as "forceful but subtle" in working with Warner's diverse business cultures,

which range from the blue jeans of acquired small record companies to the tailored suits of buyout financiers. "It was like hand-to-hand combat getting some business units onto the corporate network," Mayfield says. "Don was like an orchestra conductor bringing order to it."

At Warner, Winski forcefully advocates centralized network management and equipment purchasing for significant vendor discounts but is equally insistent on decentralized IS decision-



ANDY FREEBERG

WINSKI'S MISSION Is to provide leadership for a decentralized organization

making at the business unit level.

"Corporate headquarters does not have a monopoly on intelligence," he says. He defers explaining any IS projects in Warner's business units, saying, "I don't want to steal their thunder."

From his office in New York's Rockefeller Center, Winski says he has the necessary overview of Warner's computer and communications infrastructure to suggest strategic opportunities. "We try to be a catalyst and a facilitator but not take control," he says. "That can be hard for people from a traditional data center mentality."

Winski's mentality is anything but that. Armed with a master's degree and doctoral work in operations research at Brooklyn Polytechnic University, he joined Price Waterhouse as an electronic data processing consultant. His IS career continued at Royal Dutch Shell and Ingersoll-Rand Co., but, he says, "in my heart, I'm always a user."

He later became chief executive officer at a cellular telephone services business owned by Bell Atlantic Corp. He joined Warner in 1986 "by sheer accident" when

a headhunter called.

Although he was new to the entertainment business when he joined Warner, Winski says his IS background with user, vendor and consulting firms has given him the requisite people skills for a company such as Warner.

"I've worked with strategic planners, entrepreneurs and now with deal makers," he says. "They're all highly intelligent, highly sensitive people, and after enough years in the business, you build up a sensitivity in your fingertips in dealing with them. You get away from hard data — it's more personal."

Winski admits that it is fun living in a corporate world in which sharing an elevator ride with Robert Redford is not uncommon. "It makes me more interesting at cocktail parties," he says.

All those movies, records and cable television shows add up to a \$5 billion company with an IS budget of a hefty \$100 million. And Warner will soon swell to \$11 billion when it completes its merger with Time — whose offices are, ironically, connected to Warner's through a subterranean shopping con-

course below midtown Manhattan.

Winski is mum on the details of how the two huge IS operations will be merged but says he would like to see Warner's philosophy of a tight marriage between computers and telecommunications continue. "The information infrastructure is ineffective if you separate the two," he says.

It is at the business unit level that Winski believes the strategic systems must be developed to better serve Warner's stable of producers and performers. Computer systems may not find the next Tracy Chapman, but they can help keep the singer as a Warner artist after the talent scouts discover her. One system, for example, now provides clients with more detailed information about where their royalty payments are derived.

"Our philosophy is that the artist is always right," Winski explains. "The creative artist is the lifeblood of this company."

Wilder is *Computerworld's* senior editor, management.

Tips for success in the '90s

Ask 10 top IS executives what skills will be crucial in the 1990s, and you'll get one answer: the ability to look, think and act like a general business manager. *Computerworld* asked top IS executives to list what they consider to be the most important factors for success in the coming year. Here's what they say:

- 1 Build a competitive organization.** Bill Friel, vice-president of IS at Prudential Insurance Co., says he believes a competitive advantage comes from recruiting the right people, then motivating, training and retaining them.
- 2 Rethink business processes.** IS managers need to rethink business procedures with an eye toward simplification and greater customer satisfaction. Mutual Benefit Life Insurance Co. did just that, reducing the number of individuals who process an application for a policy from 19 to one.
- 3 Focus on customers.** "I want my people to think of the things they can do to improve the services we provide to the real customers," says Michael Zucchini, executive vice-president and chief information officer at Fleet/Norstar Financial Group in Providence, R.I.
- 4 Consider outsourcing.** Tougher competition and profit pressures will force more IS executives to take a hard look at hiring third parties to take over functions and services that traditionally have been done in-house.
- 5 Develop a global perspective.** "If you're involved with international business, you have to understand the

strengths you have in operating a telecommunications network around the world," says Robert Luft, who is currently group vice-president for chemicals and pigments at Du Pont Co. "If you don't have a competitive network," he says, "you have a real problem in your business."

- 6 Foster teamwork.** At Bank of Boston Corp., for example, uniting business managers and IS will be "one of the biggest challenges of the 1990s," says Kevin Moody, the company's director of corporate information and technology. Line managers are in the best position to envision changes in the way information systems are used, and their leadership invests projects with ownership.
- 7 Master expense justification.** More than ever, management will be saying, "'Hey, show me how this is going to make a buck on the bottom line,'" says Timothy Turnpugh, executive vice-president of operations and director of MIS at Seafirst Corp. in Seattle.
- 8 Avoid information overload.** Yes, it is possible to have too much of a good thing. The bottom line? IS managers must learn to be selective consumers of information.
- 9 Keep abreast of technology.** While developing a better grasp of the business is the key, top IS executives also need a broad understanding of technology, says Patricia Wallington, vice-president and CIO of the Information Management Division at Xerox Corp.
- 10 Stay within your budget.** Enough said.

Debunking the two-page resume myth

Saying everything you need to say will tell your prospective bosses everything they need to know

By Mark Duncan

Perhaps it is only the information systems profession, but job applicants, whether junior programmers or senior technicians, have somehow been convinced that a resume must be two pages — no more, no less.

Needless to say, it is utter foolishness to limit a description of your talents, skills and experiences on the basis of an inexplicable convention. The well-worn argument waged in favor of this convention is that managers are busy people and do not have time to read more than two pages of anything.

Nonsense!

Consider the following scenario: Acting as an intermediary, you deliver a four-page resume to your manager for a colleague. What are the chances of your manager scrutinizing the resume promptly? Now what if the president of the company hands your manager a six-page resume and asks him to weigh the strengths and weaknesses of the candidate? Chances are the manager will know that resume inside out by the next day. So, length is a poor criterion. Indeed, one should question the propriety of working for someone whose objectivity is determined by word count.

A resume's essential purpose is to act as a marketing tool, an advertisement used to convince a prospective employer (who is undoubtedly looking at many such advertisements) that you are the right

person for a job. But if your resume looks and reads like the others, why should it get special attention and treatment?

In business, the strategic imperative for organizations is to differentiate themselves from competitors, not only through product or service quality but also through eye-catching packaging and attractive side benefits. The same is true of resumes. A resume is your first — and possibly your most important — opportunity to differentiate yourself from rivals. Broadly speaking, content and appearance represent the two key opportunities for differentiation.

Why shouldn't your resume arrive in a customized envelope with a printed return address instead of a gummed label? Why shouldn't the envelope and paper be color-coordinated? Plain white stationery pales next to the aesthetic blues, grays and beiges available at most stationers.



In terms of format, there must be better and more practical alternatives to the underlined dates and company names, followed by a dry paragraph in incomplete and grammatically incorrect phrases. It may come as a surprise to some, but written English is governed by universal rules, regardless of context, that render inexcusable passages such as this: "Senior analyst on two systems. Project leader on one. Responsible for analysis, design and development. Supervised two programmers. Troubleshooting and maintenance skills."

Although the reader may extract the

information, he undoubtedly could do so more easily if it were written in correct English. If brevity is required, consider using a tabular format in which one column may have dates and position, another hardware and software and a third having company name and experience. Horizontal and vertical lines make the format truly tabular.

As for the appearance of text, the capabilities of word processors and desktop publishing software have opened up myriad possibilities. The fonts and print styles available mean no two resumes need ever look alike. Page layout must be pleasing to the eye and can now be enhanced by different print sizes, underlining and bold-facing to separate information or emphasize items.

Resume content is governed by common-sense criteria. Facts must be presented honestly and unambiguously. The reader must have no difficulty in extracting experiential data to match with job requirements. Keep jargon to a minimum.

Beyond this, a resume must also offer a certain comfort level for its subject. A resume is a very personal item and must therefore be a reflection of oneself in tone, appearance and style.

To be an effective marketing tool and serve its intended purpose, a resume must be perfect. Remember, you are trying to differentiate yourself from others. Even if it turns out that other people possess identical experience, the way that experience is presented may determine who is called for an interview.

Duncan is a quality assurance consultant at a large Dallas bank.

MBA's aren't always vital

**In the end, experience in the real world often
means more than an advanced degree**

By Janet Mason

Although some bill it as the key to the executive suite, a master's degree in business administration holds no guarantee of career advancement for the information systems professional.

In some companies, an MBA can open the door to management or bring a larger starting salary. However, in most hirings and promotions, experience is weighed far more heavily than an MBA, some observers say.

Walter Popper, a principal at Index Group, Inc., a Cambridge, Mass., consulting firm, contends that an MBA is the crucial first step toward management.

Popper notes that techniques for automating software development, such as computer-aided software engineering, call for systems developers to possess a

greater understanding of their company's business. Increasing use of such tools should lead IS organizations to place a growing value on employees with a business education, he says.

John F. Rockart, director of the Center for Information Systems Research at MIT's Sloan School of Management, says an MBA can help IS people move into line management, increasing their earning potential.

At large consulting firms, an MBA can help technical professionals understand applications from the user's perspective, says Charles Emley, partner in charge of information technology consulting at Touche Ross & Co. About half the people Touche Ross hires have just received MBAs, while the rest are hired mainly

for their work experience.


Other observers stress that work experience can outweigh formal education. If the choice is between an IS professional with an MBA and one with solid experience working with users, says Roger

Sobkowiak, a partner at Software People Concepts, Inc., a New Haven, Conn., recruiting firm, the one with experience will be chosen for a position.

At Boeing Computer Services in Bellevue, Wash., the IS staff members are encouraged to obtain MBAs

through a tuition reimbursement plan. The broader outlook they acquire with an MBA can help them better understand decisions made in the firm, says Elaine deLappe, the division's manager for human resources support services.

An MBA can be a tiebreaker in decisions on promotions or hirings, says Cameron Carey, president of Computer Security Placement Service, Inc., a recruiting firm in Northboro, Mass.

Can an MBA help boost IS earnings? Sobkowiak says it will not enhance them dramatically, while Emley says it can. Emley says that by completing a "first-class" MBA program, a corporate IS employee with a technical undergraduate degree and three to five years of experience might boost his pay \$5,000 to \$10,000. If he moved to a consulting firm, his pay might increase by \$10,000 to \$15,000. 



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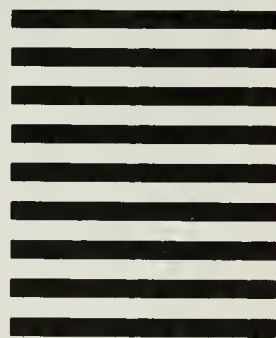
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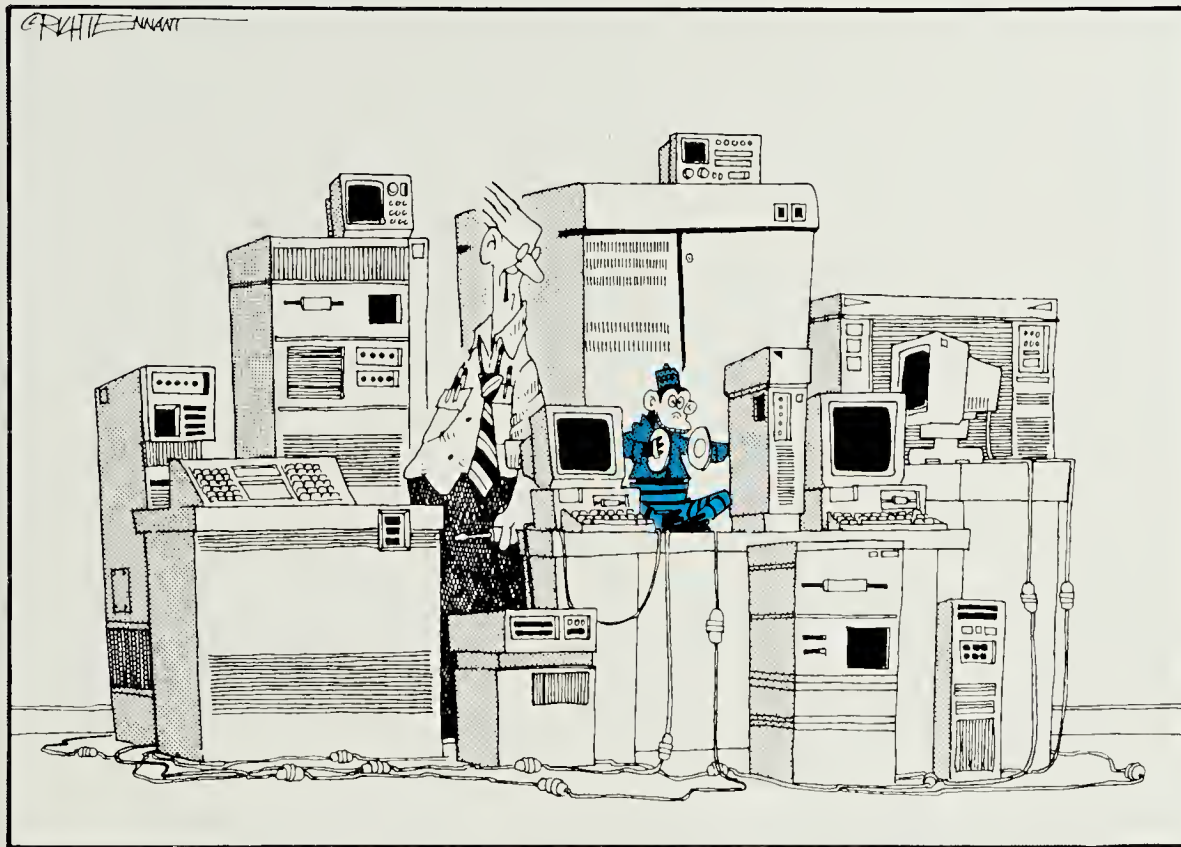
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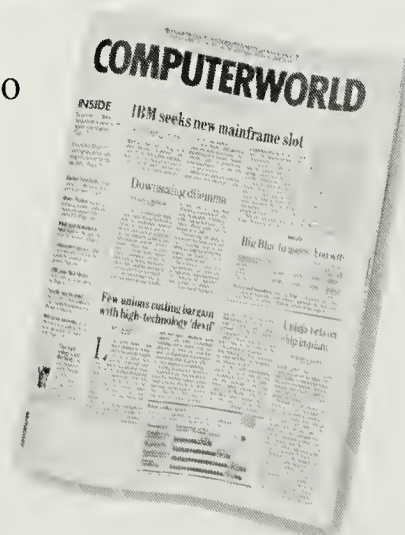
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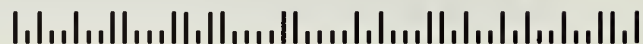
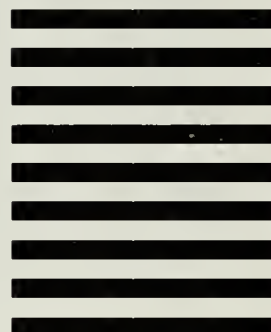
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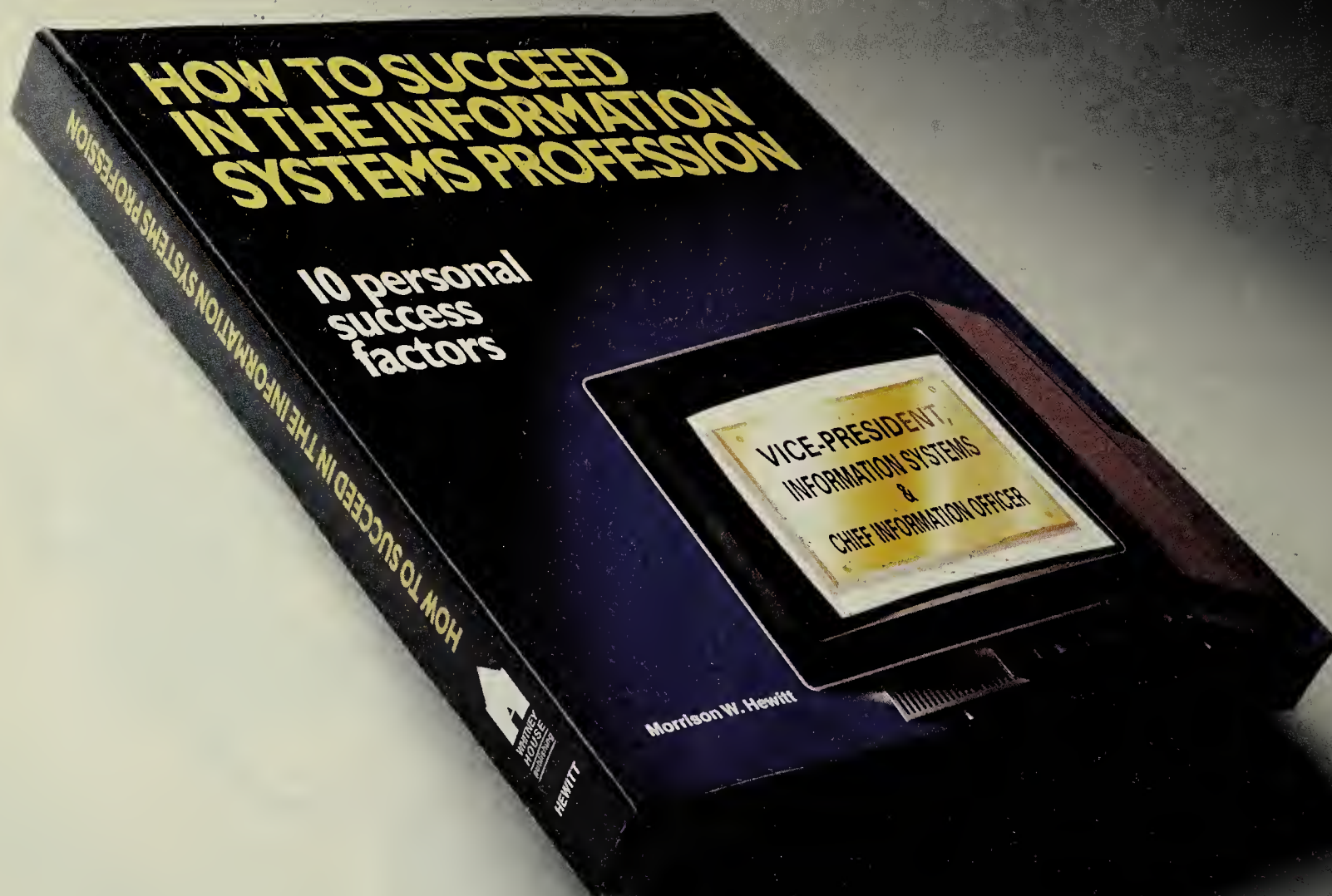
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EDITOR'S NOTE



A new school of thought

Harvard Business School grads don't go into information technology as a career. So says Warren McFarlan, a noted information technology guru who happens to teach there. Often saddled with \$65,000 in debt after completing two years at the B-School, these hot properties find more lucrative callings in marketing, general management or investment banking.

Let's call a turnip a turnip. Harvard or Stanford or Chicago grads look down on careers in information systems. Despite all they've heard and seen, they still believe IS is for techies. That is sad and a bit ironic, because these CEO wanna-bes are missing a critical point: Technology has already changed, quite dramatically, the way corporations do business. The next generation of business talent will have to be heavily steeped in technology, or it will fail.

Proponents of MBA programs designed to create general managers argue that they include courses on IS in their curricula so that graduates have a good grasp of the importance of technology. But only a couple of years ago, places such as Stanford and Harvard offered just one or two courses in technology within their graduate programs, and there is little evidence that much has changed lately. One or two courses do not a guru make.

All of which leaves a very interesting opportunity for all of you technol-

ogy types who want to find rewarding jobs with clout. A solid grounding in business and technology is quickly becoming a ticket to a fast ride up the corporate ladder, even though the chief executive officer suite remains an elusive destination.

The business landscape has seemingly changed overnight, and firms face challenges that were heretofore just concepts in journals. The 1990s corporation must search out where technology can be leveraged to create market strength and must have the people inside who can implement it.

It isn't enough to just know the technology buzzwords. A true grounding in the implementation of technology can only be achieved by getting down and dirty in the trenches. You may not have to be a programmer/analyst, but your understanding of networks, communications and systems could make you an invaluable resource for marrying business applications with strategic technology.

Now the Harvard grads will take up this challenge and point out that CEOs don't come from IS. And you can snort and grumble. Or you can simply smile and say, "Not yet."

ALEX WATERHOUSE-HAYWARD



CYBER SPACE '90

***Neuromancer* author William Gibson explores the final frontier**

I was born in 1948 in the Late Dawn period of the Information Age. I knew environments in which there was no television. My childhood was strongly colored by rampant technological optimism and a concomitant undertone of abiding dread. The two poles of the mass imagination were a glittering futuropolis, slick as Johnson's wax, and the shadows of the nuclear wasteland. I was constantly told by various authorities that the Atom would Change Everything. (Somewhat later, if less officially, I was told the same thing about LSD.)

I saw the world, then, much as I see it now — as the ultimate science fiction scenario. But the science fiction I grew up with was about technology as its makers would have had us receive it. The future would arrive on a stainless platter, probably of Scandinavian design, to be in-

stantly and obediently taken up by Americans of my generation — to be, it went without saying, applied to the purpose for which its manufacturers had intended it.

The science fiction I grew up with was seldom about garbage. Nor was it often about the messy and fascinating uses the human animal finds for the things that arrive daily from the uncounted factories of a world that sometimes fancies itself postindustrial. But the stainless platter is gone, replaced by a stream of cardboard-backed bubble packs. There is no particular end in sight and The Street, home to that messy human animal, persists in finding its own uses for things. (We have it on reliable authority that Colombia's coke barons employ expert systems to route the global flood of their product...)

My own science fiction has tended to be about garbage, the re-

fuse of industrial society. We swim (and sometimes sink), after all, in a sea of the stuff. We also swim, some of us, in largely uncharted seas of information, sustaining the very monsters of my bread and butter: the Outlaw Hacker and the Great Big Corporation. When I wrote *Neuromancer* in 1983, "hacker" had not yet acquired its current freight of negative value. Hackers were obsessive, super-bright boffins who delighted in worming their way as far into the texture of the emerging data matrix as possible; they were sometimes, in fact, the very same techie folk heroes who brainstormed the personal computer into being, some few of them even managing to become Great (or at least Pretty) Big Corporations in the process. To hack, in the original sense, was not bad; to hack was to *be there*.

Be where? Cyberspace. Not the neural-jacked fantasy purveyed in

those paperbacks of mine. Rather, in the altogether more crucial version of the concept as currently championed by John Perry Barlow, Mitch Kapor and the Electronic Frontier Foundation: the totality of information existing in the matrix *right now*. Because cyberspace, as I've been muttering for years, is already here. Or rather, we are already there and have been for some time.

This is difficult for some of us to see, likely because we're more used to technologies that open pre-existing territories. Cyberspace, in Barlow's sense, is a territory *generated* by technology. As such, the "territory" itself is subject to constant growth and permutation — a cybernetic Wyoming writhing in some eerie interstice between concept and silicon. Yet real, surely, because we can be rousted by the Secret Service for crimes alleged to have been committed there.

And now, teetering on the brink of a new world order/chaos theory, apparently having arrived just in time to describe the global political situation, we are told that Virtual Reality technology is about to Change Everything. The video helmets and data gloves of VR are our current hot tickets to the future.

But the future has junkyards, where one day even the hottest machines must be left out in the rain to rust. All technology eventually gathers dust. What matters is territory, and in its generation of territory, the advanced technology of information is unique. The territory is there, awaiting partition. Fascinating as the potentials of

**Cyberspace is a territory
generated by technology
subject to constant
growth and permutation —
a cybernetic Wyoming
writhing in some eerie inter-
stice between concept
and silicon.**

VR may be, I'm more impressed by the Kaporian metaphor of the electronic frontier.

Cyberspace, today, seems just that — a virtual frontier sparsely inhabited by technical pioneers: loners, visionaries and even outlaws, all of them willing to live off the land. Both the hacker and the corporation (let us include governments and military entities) have been aware of the territory, in some sense, from the beginning — the hacker, by nature of his being, and the corporation, by virtue of its need to define itself.

The first hackers were, in many instances and quite literally, creators of the territory they explored; as such, they were necessarily possessed of a certain edge. But the railroad is no doubt on its way in the form of the Great Big Corporation, and

with it will come what my colleague Bruce Sterling has called the Planned Development of Hyperreal Estate. The proto-hackers of the 1970s may one day be remembered as cybernetic mountain men, the earliest settlers in a landscape long since dominated by data malls and information megamarts.

Or perhaps I'm merely being romantic; perhaps the mall, the dominant structure of our economy, is already firmly in place. In the data mall, the majority of users go about their business in the most ordinary way. Most, in fact, are as yet unaware of the mall itself and see only their own specific destinations and the functions they must perform there. Amid these good and ordinary folk of Cyberia, however, there may sometimes be found exceptions: spies, vandals, voyeurs, terrorists, artists and combinations thereof. But these others have one thing in common, if nothing else: They are aware that there *is* a mall. (Though our data mall currently differs from the concrete and glass model in one minor, but perhaps crucial, specific: Scattered amid the chain stores and fast food franchises are meeting places of an almost European intimacy — nonprofit hangouts of hair-down boho splendor. These are bulletin boards, and our "other users" are prone to spend a good bit of time there.)

Myself, I'll stick with garbage, because my real business has less to do with predicting technological change than making evident its excesses. I'll stick with the poetry inherent in reels of magnetic wire recordings, rusting under a sun-faded card table at a California swap meet. We may not actually recall the machines required to summon voices from these brittle yards of steel, but there's an appealing melancholy in the fact that the vendor is unaware that these *are* recordings. All those voices. Other days, other days.

And one day our floppies will lie there by the millions, warping and gathering dust, not to mention that svelte laptop you've just decided on.

Meanwhile, I'd advise those of you so inclined to definitely go West. It's either El Dorado or a shopping mall — same as it ever was, somehow.

Linz, Austria/Vancouver, B.C.

September 1990

Gibson is the author of *Neuromancer* and winner of the Hugo and Nebula Awards for science-fiction writing.

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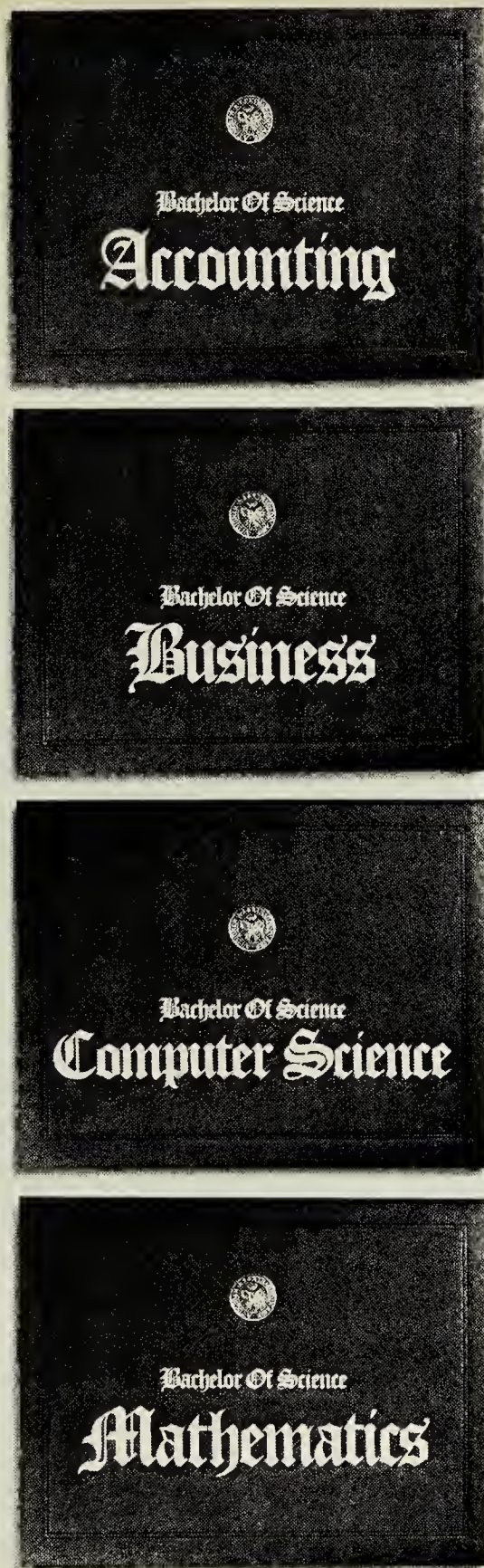
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|----------|-------|----------------------|
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| 5) _____ | _____ | E. R&D |
| 6) _____ | _____ | F. Other |

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Are you planning to attend graduate school in the next two years?

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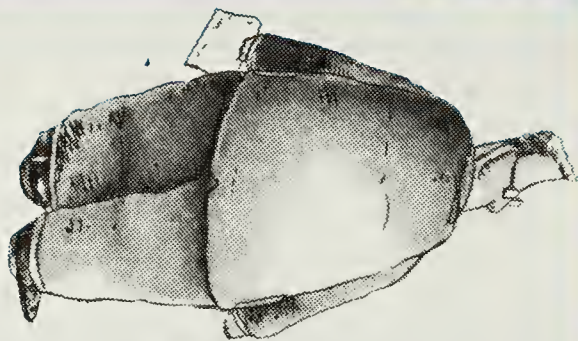
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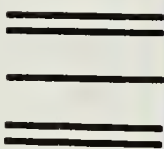
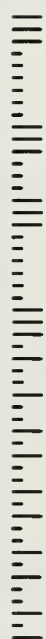
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DREAM JOBS

Where you
want to work,
and why

By Sheryl Kay

If you had your druthers, where would you like to work? *Computerworld* posed that question to 800 students in information systems, computer science and electrical engineering programs around the country and came up with a list of the Top 10 companies. Traits the students looked for among potential

into the Top 20.

Hal Sullivant, president of the systems recruiting firm Linn-Truett, Inc. in San Antonio, Texas, believes this may be largely because of name recognition. "They see advertisements in journals; they are staring at hardware and software with these companies' names all

Big Blue as their top choice.

"IBM is the pacesetter," explains Angel Mays, who is currently working toward a bachelor's degree in computer science at Franklin University in Columbus, Ohio. "When it takes the lead, everyone else follows," she says.

While IBM will hire fewer college students than

usual in 1990 to maintain its policy of no layoffs, college recruiting will be back up in 1991, according to Lee Covert, manager of IBM's national recruiting organization based in Purchase, N.Y.

The company is looking for hires with bachelor's degrees in computer science, electrical engineering, mathematics, accounting

and business.

"Students coming to work for us will work with leading-edge technology, in small teams and with a diversity of assignments," Covert says. For Mays, that job description sounds just right: "I love making that bucket of bolts do what I want it to do."



1. IBM	497
2. AT&T	342
3. Hewlett Packard	191
4. DEC	134
5. Apple	101
6. General Electric	95
7. Motorola	85
8. Arthur Andersen/ Andersen Consulting	65
9. Microsoft	64
10. Intel	51

Total responding: 772

(Students were asked for their top five choices; the list reflects the total number of mentions of each company.)

Source: *Computerworld*

employers included opportunities for further education and training, a global corporate outlook and meaningful responsibilities.

Interestingly, all of the Top 10 companies are in some way involved directly with the business of technology. No banks, insurance firms or retail companies even made it

over everything," Sullivant says. Students are constantly being bombarded with information about these companies and their reputations while in school.

Here are profiles of the Top 10:

#1: IBM

Well over half the students listed

STUDENT PROFILES



George E. Klimes

Age: 26

► **B.S., biology, computer science minor, Georgetown U., Washington, D.C. Working on master's, computer science, George Mason U., Fairfax, Va.**

► **"I'll be teaching intro to computer science this fall at Georgetown, but I also have a part-time computer consulting business."**



Richard Pyra

Age: 26

► **B.A., computer science and math, Rhodes College, Memphis. Working on MBA, finance and IS, University of Rochester School of Bus. Admin., N.Y.**

► **"My goal is to secure a partnership with a consulting firm or become a divisional manager with a technology firm or group."**

#2: AT&T

"I'd like to help them come up with newer and better telecommunications hardware," says Raymond Papp of Farmington, Conn., describing what he would do if offered a job by AT&T.

While working toward his master's in business management at Central Connecticut State University last year, Papp wrote a paper on AT&T's signaling system. "I found AT&T to be an international pioneer in the field," he states.

Recent graduates are attracted to AT&T because of its worldwide product and services reputation, says Gale Varma, manager of corporate college recruiting for AT&T in Morristown, N.J.

"We are a global company with projects of international scope, and global is in with the students today," she says.

Varma forecasts approximately 2,000 new college graduate hires in 1991, with an even mix of undergraduate and advanced degrees who will work as software developers and systems engineers. Most college recruiting is done on campus; however, Varma says, her office receives more than 200,000 inquiries per year.

#3: Hewlett-Packard Co.

Students who seek a team-oriented environment yet desire an opportunity to express their individual creativity would feel right at home with HP, says Kathy Burke, the company's national college relations and recruiting manager in Palo Alto, Calif.

Burke estimates that in 1991 HP will hire 600 college students with degrees in computer science, electrical engineering, mechanical engineering, industrial engineering and business administration.

According to Burke, HP has a unique, informal management style as well as a commitment to the community in which it resides.

For Eli Robinson, a first-year MBA student at the University of Vermont, that HP philosophy is in line with his future goals. Robinson, who is interested in sales, says he would like to work for "a company that puts out quality products because I'll be selling directly to the end user, and it's important to represent something that won't come back to haunt me."

Through conversations he has had with acquaintances who work for HP, Robinson has learned that HP projects are worked on by small groups of people — something he finds attractive.

#4: Digital Equipment Corp.

DEC's presence on campus leaves a lasting impression, according to Deann Sklenak, personnel consultant in DEC's college program office in Maynard, Mass.

"Many students have worked extensively on our VAXs at school," Sklenak says. Such experience tends to influence students to look to DEC upon graduation, she adds.

Alec Berenbaum agrees. Having worked with DEC equipment and service personnel, Berebaum,

who is currently pursuing an M.S. in computer science at Rochester Institute of Technology in New York, gained respect for the firm as one of the leaders in networking. It's one of his top choices for employment.

As with many companies in the Top 10, DEC offers staff career paths in technology or management. Sklenak emphasizes that the two ladders parallel each other; in fact, employees may go back and forth between the two as well as change divisions.

#5: Apple Computer, Inc.

Headquartered in sunny Cupertino, Calif., the "Apple campus" is described as casual and laid back, "an easy transition from college," says Apple college relations staffing specialist Ron Jennings.

Rob Sabey, of Rock Hill, S.C., learned from friends who were interns at Apple that new hires were given project responsibility from day one.

"If the opportunity were right," says Sabey, who just completed his MBA at Brigham Young University in Provo, Utah, "I'd want to work with [Macintosh] networks in corporate MIS."

"Mac programming is highly sought after," Jennings notes; however, he says, it "is not necessarily more important than a good mainframe background." Many students who are ultimately hired at Apple have gone through a summer internship with the company, he adds.

Jennings also stresses that students will find Apple to be strongly committed to diversity in the work force. Women and minorities will feel very much at home there, he says.

#6: General Electric Co.

Noting that the number of individuals entering IS programs may be shrinking, Randy Johnson, manager of GE's IS management program in Bridgeport, Conn., says it's important that students "regard us as one of the best."

For Dahong "David" Qian, working for the company he considers the best is a major reason he'd like to work for GE. Now working toward a master's degree in mechanical engineering at the University of Texas at Austin, Qian's knowledge of GE comes mainly from his uncle, who is currently employed as a chemical engineer at GE in Albany, N.Y.

"He described it as an exciting place to work, where you are teamed up with senior employees, so you learn a lot. He says you are given the chance to achieve personal ambitions," Qian explains.

In fact, training is one of GE's major drawing cards, Johnson says. Through a combination of classroom and on-the-job training, new hires are able to continue to develop the skills that they learned in school.

In 1991, Johnson anticipates that GE will hire approximately 80 students for the IS management program, the majority of whom will have bachelor's

Continued on page 12



Computer science major Cary Cannova made an intelligent choice when he joined Amoco. **B**ecause right out of school, he's involved with a cutting-edge information management system that's changing the way we do business. **T**he project is EPICS (Electronic Processing of Information, Cash and Sales), and it's taking our 3,500 service stations from a paper environment to a fully electronic network. **O**ne smart enough to automatically record sales, monitor inventory, activate pumps, even

access an expert "help" desk. **E**PICS gives Cary a programming challenge that integrates all aspects of the company, from Accounting to Marketing and Sales. **I**t also connects him to every community where Amoco retails. **B**ecause EPICS can flag underground tank leakage. **I**t's the safest detection system yet. **I**f you want to work not just with data but with important human considerations, choose Amoco, and help make the world a more intelligent place.

"I'm helping create a network of stations as intelligent as this one."



Amoco Corporation
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Continued from page 10

degrees in computer science, business or math. The Edison engineering management program in Bridgeport, which requires students to have a degree in electrical or mechanical engineering, will have at least as many openings for grads.

#7: Motorola, Inc.

Anna Dorfman, a recent graduate of the University of Illinois in Chicago, now works for Motorola as a programmer/analyst in the company's Manufacturing Business Systems Division. For her, Motorola's educational opportunities and international status were important.

Tuition reimbursement was high on Dorfman's list in finding an employer. "I want my master's degree, and Motorola offers 100% paid tuition," she says.

In addition to training, Motorola gets student hires involved in a meaningful project right from the start, says Tunnie Glass, manager of professional and technical recruiting at Motorola's headquarters in Schaumburg, Ill. "We offer a variety of work assignments, from semiconductors to general business systems to cellular telephone pagers," Glass says.

The firm's global nature also grabbed Dorfman's interest. "With different operations around the world, I would have the ability to move around," she observes.

#8: Arthur Andersen & Co./Andersen Consulting

Continued training is what Alan Yong was looking for in a new employer. It is also what this May 1990 graduate with a bachelor's degree in business administration in

MIS from the University of Oklahoma had in mind when he put Andersen Consulting on the top of his list.

"A good friend of mine working there, as well as a recruiter who came to our campus, described Andersen's training program as being the best in the business," Yong says.

Through its worldwide education center based in St. Charles, Ill., Andersen Consulting provides each employee with training, according to Mike Noling, the company's managing partner of operations support in Los Angeles.

Furthermore, new hires get responsibilities from the beginning. With Andersen Consulting's systems integration focus, individual staff members are involved in a variety of assignments. "Consulting," Yong says, "would provide me with the challenge of solving a variety of systems problems, while enabling me to keep current on what's happening in the field today."

#9: Microsoft Corp.

Victor Gurule of San Louis, Colo., pinpoints Microsoft as a "computer science-type company" and as a place he'd like to work.

"I've heard it's a very laid-back technical environment, where you get thrown right into a project, and it's easy for bright computer engineers to advance," says the May 1990 computer science graduate from the University of Colorado.

"Each new student hire does have a tremendous amount of responsibility from day one," says Julie Walker, senior technical recruiting manager at Microsoft. "New

employees can make an impact right up front, knowing that the product they've worked on will reach a market of millions of people," she says.

Microsoft's Redmond, Wash., headquarters is a relaxed setting that includes fountains and gardens. Employees are offered extremely flexible work hours, and there is no dress code.

If he were hired, Gurule says, he would want to work either on a Windows or operating system project at Microsoft.

Promotion at the company is based on performance, Walker says, and employees can take a management or technical track.

#10: Intel Corp.

The ability to blaze your own trail, says John Moore, program coordinator for corporate college recruitment at Intel, is luring many students to Intel. "Supervisors may watch what you do, but you're given the opportunity to succeed, rather than looked upon as taking a risk to fail," he says.

Students are put to work on "very live projects," sometimes in the first week of employment, Moore adds.

For Suber Patel, who is working on a master's degree in electrical engineering at the University of Wisconsin, attending an Intel open house brought that point home. He listened to speaker Ming Ling, who had graduated from the university a year before. "He was already one of the main product design engineers for the I860 chip," Patel observes.

Moore estimates that Intel will look to hire approximately 400 students in 1991, half with undergraduate degrees and the rest with master's degrees and Ph.Ds. Moore will be looking for graduates who have specialized in any of several disciplines, including electrical engineering, computer science, material science, chemical engineering, physics, finance and accounting.

Once Patel completes his master's degree in electrical engineering, he plans to begin studies toward his MBA. "I'd like to be in one of Intel's technical groups, such as the VLSI group, but I'm also interested in marketing. An MBA will come in handy," he explains.

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

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JULIA TALCOTT

INTERNSHIPS:

If you're an information systems student waiting in line to register for next semester's courses, you may want to consider signing up for an internship to supplement your classroom learning. Some of you may not have a choice; internships are required in many IS programs.

"School is great for a surface knowledge of IS, but to know what you're actually going to do when you get out there, you need an internship," says Cheryl Smith, a senior MIS and marketing student at New York University. Smith spent last summer doing an internship at Citicorp in New York in the international division of the bank's Consumer Services Group. She worked with the design and development group, which was developing an international network to link all of Ci-

How they can work for you

By Kelly E. Dwyer

ticorp's different services together outside of the U.S.

Smith joined the company at the beginning of the project and was heavily involved in the documentation process, which required her to address user needs and prototype interfaces.

"I can't believe how much I learned," she says. "When I came back to school, it gave my classes so much more meaning."

Besides taking their experience back to the classroom, many students use it to help them get permanent jobs when they graduate.

"My internship made the transition into the 'real' world easier," says Meera Panchal, who now works as a project manager at Bose Corp. in Framingham, Mass. Panchal's relationship with Bose, a maker of loudspeakers and electronics equipment, began with a project team she worked on while obtaining her MIS-oriented MBA from Boston University in 1986. "It was a way to show potential employers that I wasn't shut off from

the real world for a year and helped convince them that I could do it."

Advocates of IS internship programs claim that internships help students learn what the working environment is like and give them a broader perspective than their academic curriculum provides.

"The internship experience is at least as great as any class you can take," says Steve Shankman, a University of Arizona MBA student who completed an internship at American Express Co. in its performance engineering and human resources department. Shankman's responsibilities ranged from helping people put together form letters to writing a program to tabulate the responses from an ongoing attitude/opinion survey that employees complete to measure the quality of the work environment.

"I was more of a consultant than anything else," he says. "I created databases and consulted with users who were having problems."

Eric Birchfield at the University of Texas at Austin had a similar experience at Coopers & Lybrand in Dallas. "I saw it as a chance to check out the consulting environment," he says. As a result of his experi-

ence, Birchfield says he understands systems analysis and design better. In one project that he worked on, "no one knew how to run a product, how to use it or what it could do. I learned it, trained some staff [members] on how to use it and gave a presentation to upper management about what the product did and was capable of doing."

Besides learning from his experience, Birchfield says he was able to contribute rather than just feeling like an extra body.

A REAL JOB

Internships are also valuable from the perspective of those who oversee such programs. "It's my job to make sure that the internships are true work experiences, not just summer jobs," says Domenick Cama, a technical associate program manager at Citicorp's New York technology office. "The students work with all different hardware and also do a lot of different analytical work."

Cama says the number of internships at Citicorp has been steadily increasing during the past couple of years, a trend he says he feels is a measure of the success of internship programs. He also attributes the

increase to the high quality of education many interns now receive on campus, where state-of-the-art equipment is finding its way (see story page 43).

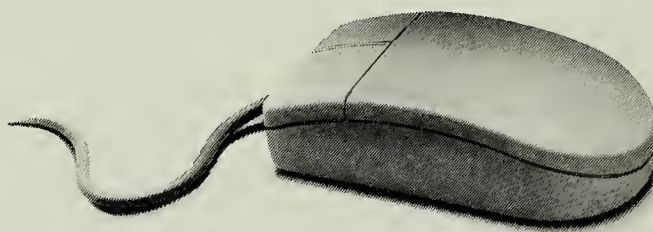
"It's educationally important for students to be able to practice the skills they've used in class," adds Jack Baroudi, associate professor at the Stern School of Business at NYU. "It's not as easy in the real world as it is in the classroom."

Internships often lead directly to jobs. Citicorp hires close to 50% of the students who start as interns.

AT&T also hires interns with the intention of offering them full-time positions when they graduate. "It really reduces our recruiting costs," says Evangeline Noble, a personnel services specialist and recruiter at AT&T's Guilford Center location in Greensboro, N.C. "If the student has a positive experience, [he passes] that along, which helps to generate business back on campus."

Besides finding out about internships on campus, some students pursue them on their own with companies they've always wanted to work for. Miro Perez, a senior at the University of Texas at Austin, targeted

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Apple Computer, Inc. He sought contacts through the school's placement office but got in touch with them on his own. He was offered two internships at the firm after interviewing with Apple representatives.

Perez chose a job in the development and technology department at Apple's Integrated Systems Division because he thought the area was at the leading edge of technology. His duties included developing a database program and working on mainframe-to-Macintosh connections.

He was also involved in a database project prototype, which Apple says it is planning to implement soon. "I can tell future employers, 'I did this and it's being implemented,'" he says. "That's a real plus."

Internships may indeed be the single most important item on a resume. "The company wins because it gets good help for the summer, and the students win," says Jeff Hoffer, chairman of the IS department at Indiana University. "We win because it's good for our program." ◀

Dwyer is a former *Computerworld* intern who now works as a CW copy editor.

Experiencing your ideal internship



eterans offer these tips for landing a great internship and making the most of it:

- Don't stick to just one source in searching for an internship. Check your school's IS department, career placement office and job postings. Also, ask professors and friends if they know of any opportunities.
- Meet company representatives personally if they visit your campus.
- Look for something in your specific area of interest. Employers will want to know that your internship was more than a way to earn summer money.
- Keep trying! The perfect opportunity may not fall into your lap.
- Study hard. Know your field well enough to work on projects that will tangibly benefit your employer.
- Look for a mentor. Pairing up with a permanent employee is a great way to learn.
- Don't be discouraged or intimidated by new problems. Supervisors understand that you are there to learn.
- Seek monthly reviews with your supervisor. If your only review is at the end of your internship, you will not have any opportunity to correct your mistakes.
- Get to know as many people as possible. Your internship can provide you with valuable contacts for the future.
- Be aggressive! Go beyond your assigned responsibilities. "You have the latitude," one former intern says, "to do some things people in the company can't because they are bogged down in the details of their work."

DEREK SLATER, *COMPUTERWORLD* INTERN

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The long, hard climb

Career paths of 10 high-level IS executives

By George Harrar

In the mid-1960s, Michael Simmons was a biology teacher at Arsenal Technical High School in Indianapolis. Now, at age 50, he is executive vice-president of technology and operations at Bank of Boston, the head of a 2,000-member organization.

Charles Carlson, who in 1954 received a bachelor of arts degree in English literature from the College of St. Thomas in St. Paul, Minn., today oversees the delivery of information processing and voice/data communications to the business units of retailer Sears, Roebuck and Co.

Rick Adam graduated from West Point in 1968 and headed into

the Air Force for five years. Five jobs later, he presides over the global operations and information technology department at financial company Goldman, Sachs & Co.

The profession now known as information systems barely existed 30 to 40 years ago when many of today's chief information officers left college looking for work. Without any role models to follow — or long-term plans in their heads — they set off in the various directions that ended up inside the CIO's office.

Carlson, for instance, started at Sears as a part-time salesman during high school in 1948 and has been

there ever since. He was working on his doctorate in English literature with plans to be a professor, "but I was offered the opportunity to be a department manager at Sears, and the pay was \$5,400 a year. A friend of mine had just gotten a Ph.D. at Harvard and was getting paid \$5,000 to teach at the University of Iowa." Based on the money, he says, he decided to stay at Sears instead of teaching.

In 1965, Carlson was sent as the representative of store operations into the systems department, where, as he remembers it, the first fully automatic point-of-sale system was being developed. Living and breathing



Charles Carlson
VP, tech services
Sears, Roebuck



Rick Adam
CIO and partner
Goldman, Sachs



Susan Mersereau
VP, general manager
Weyerhaeuser



John Ullrick
VP and director, MIS
Playboy Enterprises

data processing led Carlson to move officially into that area in 1969 as manager of the Louisville Retail Systems Research Center.

Unlike Carlson, Adam chose to use one company as a springboard to opportunity in another. He left the military with an engineering degree and gained a reputation as an IS turnaround specialist, moving from FMC Corp. to Litton Industries, Inc. to Baxter Healthcare Corp. When Goldman Sachs management needed to overhaul a moribund systems department, they sought Adam out.

LESSONS LEARNED

Drawing lessons from people at the pinnacle of their careers in 1990 and applying them to today's college graduates can be tough. As IS has matured as a profession, many more options have become available, such as getting a bachelor of science degree in computer science and an MBA in IS or specializing in a nonmainstream technology such as imaging, supercomputing or neural networking.

Yet the impressive resumes of 10 top IS chiefs (beginning on page 18) do reveal some lessons for those whose *curricula vitae* is long on education and short on work experience:

- Liberal arts graduates should not feel that they are necessarily over-matched by job candidates carrying technical degrees.
- The fastest movers in the field are the people who grab every opportunity for advancement, whether it fits in with their career plan or not.
- As vendors continue to build equipment and create software that

functions better, companies will need fewer people with technical skills and more people with the business sense to put the technology to use.

- Working for a vendor firm soon after school can provide valuable insights into technology and important job connections for the person wanting to work at a user firm.

Susan Mersereau, the vice-president and general manager of Weyerhaeuser Information Systems, began her work life as a high school history teacher. She comes from a strong liberal arts background, and when she talks of her interest in languages, she means German, not Cobol and C.

"My education encouraged me to focus on the interrelationships of any problem we were considering," Mersereau says. "I studied history in the context of economics, finances, world affairs, art and culture. In IS today, the biggest challenge is not only to understand the technology as it is evolving but also how it fits with the whole construct of the organization. I'm always trying to integrate the pieces that aren't naturally linked."

People who want to stay on a technical track throughout their careers should probably begin that focus on technology in college, Mersereau says.

However, "if they want to go into the business side of things, then they must learn how to identify what the business problems are and how to apply the technological solutions," she adds.

Mersereau says she feels she ended up in a career that suits her mind-set. She prefers a field such as

information technology in which there is often no right or wrong answer — it's how you put the pieces together to solve a problem.

Although she has become the first female to oversee an operating division at Weyerhaeuser, a Seattle-based wood products company, Mersereau still continues her education. This year, she completed her second master's degree, this one in organizational change at Antioch College in Yellow Springs, Ohio.

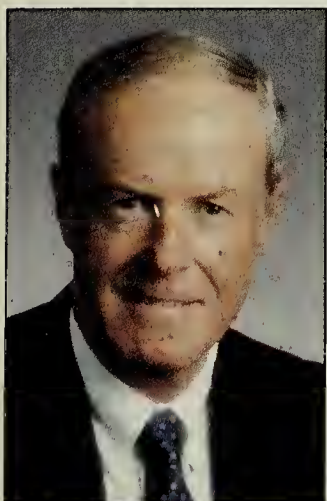
NONTECHNICAL BACKGROUND

John Ullrick, vice-president of MIS at Playboy Enterprises, Inc., studied marketing in college and began his work life as an accounting trainee at U.S. Steel Co. He was promoted to an administrative position in an unfamiliar area — computer operations.

"It was somewhat overwhelming," Ullrick says, "because I didn't even know what a computer was." The technical people working for him needed little guidance, giving Ullrick the chance to slowly learn the complexity that goes along with computer operations.

Today, he shies away from applicants to his staff with unusually strong technical backgrounds, unless they have minored in finance or business. "Our stated business plan is one of growth and acquisition," Ullrick says, and therefore, "I always hire the strong business person because you can teach him the technical side pretty quickly, as long as he has the mind for it. It's much harder to teach a technical person the business

Continued on page 20



James Sutter
VP, general manager
Rockwell International



Carlene Ellis
VP, administration
Intel

CINDY CHARLES



Max Hopper
Senior VP, IS
American Airlines

STEVE SAXTON/GAMMA LIAISON



James Marston
Senior VP and CIO
American President

CHARLES A. CARLSON

EXPERIENCE

1988-present

Vice-president of technology services, Sears, Roebuck and Co.; president, Sears Technology Services, Inc.

1981-1988

Vice-president, information systems and data processing, Sears, Roebuck Merchandise Group.

1980-1981

National manager of the computer and telecommunications services department, Sears.

1976-1980

Territorial manager of the data processing department, Southern Territory in Atlanta, Sears.

1969-1976

Manager, Louisville Retail Systems Research Center in the national data processing department, Sears.

1965-1969

Staff assistant, national retail operating department, Sears.

1957-1965

Management positions, Sears retail stores.

1948-1954

Part-time salesman, Minneapolis Sears retail store.

EDUCATION

Graduate work as a Woodrow Wilson fellow, University of Iowa, Iowa City, 1955-56.

B.A. in English literature, College of St. Thomas, St. Paul, Minn., 1954.

GEORGE F. (RICK) ADAM

EXPERIENCE

1987-present

Chief information officer and partner, Goldman, Sachs & Co. Responsible for the information technology department as well as Global Operations — the firm's worldwide securities, commodities and futures processing capabilities.

1980-1987

Corporate vice-president and chief information officer, Baxter Healthcare Corp. Operated the Information Systems Division and headed a new for-profit division called the Baxter Systems Division.

1978-1980

Associate director of computer systems, FMC Corp. Ran the corporate data centers, telecommunications services and systems development.

1976-1978

Director of computer systems, Litton Industries, Inc.

1973-1976

Sales representative, IBM.

1968-1973

Captain, First Lieutenant, Second Lieutenant, U.S. Air Force. Worked as computer officer and data center manager in the Apollo space program.

EDUCATION

B.S. in engineering, West Point, 1968.

SUSAN MERSEREAU

EXPERIENCE

1988-present

Vice-president and general manager, Information Systems Division, Weyerhaeuser Co.

1983-1988

Director, telecommunications, Information Systems Division, Weyerhaeuser.

1982-1983

Manager of advanced planning and technology, Information Systems Division, Weyerhaeuser.

1981-1982

Program manager, solid wood, Weyerhaeuser.

1978-1980

Director, department of planning research and evaluation, Seattle School District.

1976-1978

Director, department of management information services, Seattle School District.

1971-1976

Research positions.

1970-1971

Administrative assistant, Teacher Corps. Program, University of Illinois.

EDUCATION

M.A. in teaching history, University of Chicago, 1971.

B.A. in history, Scripps College, Claremont, Calif., 1968.

JOHN ULLRICK

EXPERIENCE

1987-present

Vice-president, MIS; director, MIS, Playboy Enterprises, Inc. Oversees staff of 20 charged with finding opportunities to use information processing to help build the company.

1984-1987

Director, MIS, The Pepper Companies

1981-1984

Manager of information systems, UOP, Inc., Signal Resco.

1973-1981

Project leader and senior systems analyst, Automotive Products Division, UOP.

1967-1973

Programmer/analyst, procedures analyst, operations supervisor, accounting supervisor and accounting trainee, U.S. Steel Corp.

EDUCATION

B.S. in marketing, University of Illinois, 1967.

JAMES F. SUTTER

EXPERIENCE

1983-present

Vice-president and general manager, Rockwell International Corp.

1980-1983

Director, corporate information management, Xerox Corp.

1975-1980

Director, corporate information systems & telecommunications, Xerox.

1974-1975

Manager, administrative business operations, Xerox.

1971-1974

Manager, international planning, Xerox.

1970-1971

Manager, systems architecture & control, Xerox.

1967-1970

Manager, manufacturing services, Xerox.

1966-1967

Manager, data processing, Iowa Beef Processors.

1961-1966

Management trainee and manager, data processing, Rexnord, Inc.

EDUCATION

MBA in finance and business administration, Marquette University, 1970.

B.S. in finance, University of Notre Dame, 1959.

CARLENE M. ELLIS

EXPERIENCE

1987-present

Vice-president, Administration Group, Intel Corp. Corporate officer since 1989.

1985-1987

Director of corporate information services, Intel.

1980-1985

Head of planning and control function in corporate information services; manager of application systems and director of marketing services, Intel.

1976-1980

Manager of information services and other information systems management positions, Fairchild Camera and Instrument Corp.

1973-1976

Assistant IS officer and other data processing positions, city of Jacksonville, Fla.

1971-1973

Applications programmer, Western Electric.

1969-1970

Engineer, Western Electric.

EDUCATION

Postgraduate work at University of Georgia and University of Alabama.

B.S. in mathematics, University of Georgia, 1969.

MAX D. HOPPER

EXPERIENCE

1985-present

Senior vice-president, information systems, American Airlines. Spearheads and supervises the systems efforts of the airline and its parent, AMR Corp.

1982-1985

Executive vice-president, Bank of America.

1980-1982

Vice-president, data processing and communications services, American Airlines.

1972-1980

Assistant vice-president, marketing automation programs, and director of Sabre reservations system, American Airlines.

1970-1972

Director, Unimatic computer systems, United Airlines.

1967-1970

Consultant on automated systems, Electronic Data Systems Corp.

1958-1967

Positions in research department, Shell Oil Co.

1953-1955

Positions in research department, Shell Oil.

EDUCATION

B.A., University of Houston, 1960.

JAMES MARSTON

EXPERIENCE

1987-present

Senior vice-president and chief information officer, American President Companies Ltd. Also president of American President Systems Ltd. Responsible for all of information systems, computers and communications for this \$2.3 billion international shipping, stack train and truck company. Oversees a staff of 450.

1986-1987

President and chief operating officer, AMR Corp. Technical Training. Directed the start-up of this major American Airlines affiliate, which provides high-technology training.

1982-1986

Vice-president, data processing and communications services, AMR.

1972-1982

Officer positions, U.S. Air Force, including assistant deputy chief of staff, data systems; director, computer applications; deputy assistant for data automation, Europe; deputy director of computer resource planning; and division chief, computer applications.

1956-1972

Operational and computer assignments.

EDUCATION

M.A. in public administration, University of Oklahoma, 1970.

B.A. in political science, University of Maryland, 1955.

ROBERT J. FETTEN

EXPERIENCE

1988-present

Director, information services, The Metropolitan Opera. Responsible for system design, programming and operations.

1980-1981

Assistant vice-president, Manufacturers Hanover Trust Corp. Was senior manager for five project leaders dealing with internal consulting and development of new technology for international funds transfer.

1976-1980

Assistant treasurer, Chemical Bank. Was senior manager overseeing four project managers.

1975-1976

Vice-president, John C. McWilliams and Associates. Consulted for a firm advising the hospital automation field.

1972-1975

Director of systems and data processing and associate director of finance, George Washington University Medical Center.

1967-1972

Director of systems and data processing, Mount Sinai Medical Center.

1965-1967

Program coordinator, Control Data Corp.

EDUCATION

B.S. in mathematics, George Washington University, 1972.

MICHAEL SIMMONS

EXPERIENCE

May 1990-present

Group executive and executive vice-president of technology and operations, Bank of Boston. Leads a restructured and centralized group of more than 2,000 employees charged with providing advanced technology and operational support to the entire corporation.

1988-1990

Executive vice-president of Bankamerica Systems Engineering. Responsible for designing and operating worldwide computer and telecommunications systems.

1984-1988

President, Fidelity Systems Co. Directed a work force of 1,100 responsible for data processing operations, software development and customer service.

1980-1984

Executive vice-president, information systems and operations, American Fletcher Bank.

1968-1980

Systems engineer, IBM. Installed equipment, wrote applications packages and provided technical help to customers.

1964-1968

Biology teacher, Arsenal Technical High School.

EDUCATION

B.S. in biology, Indiana State University, 1964.

Continued from page 17
side of things."

If running the systems operation of a major corporation is the career goal, what is the first step? It may be working for a vendor company.

"That first job was the most fortu-

itous," Simmons says, "because one of my accounts was American Fletcher Bank. When they needed someone to fix their DP problems in 1980, they offered me the opportunity."

Adam was a sales representative for IBM from 1973 to 1976 and had Litton as

one of his accounts. When that company needed a new director of computer systems, it didn't have to look far.

Working for a vendor can help a young engineer not only prove his technical talents but also help hone them.

"One characteristic of computer companies," says James Sutter, who worked for 16 years at Xerox Corp., "is that they put a lot of emphasis on training."

Currently vice-president and general manager at Rockwell International Corp., Sutter says that if he were starting out today, he would consider a different launching pad into IS — systems integration at a place such as Arthur Andersen. "There you are thrown into a wide range of installations, helping with training and implementation. That's where you can get a firehose dose of experience. Drink from the firehose wherever you can find it," he says. ◀

Harrar, former features editor at *Computerworld*, is a free-lance writer based in Wayland, Mass.

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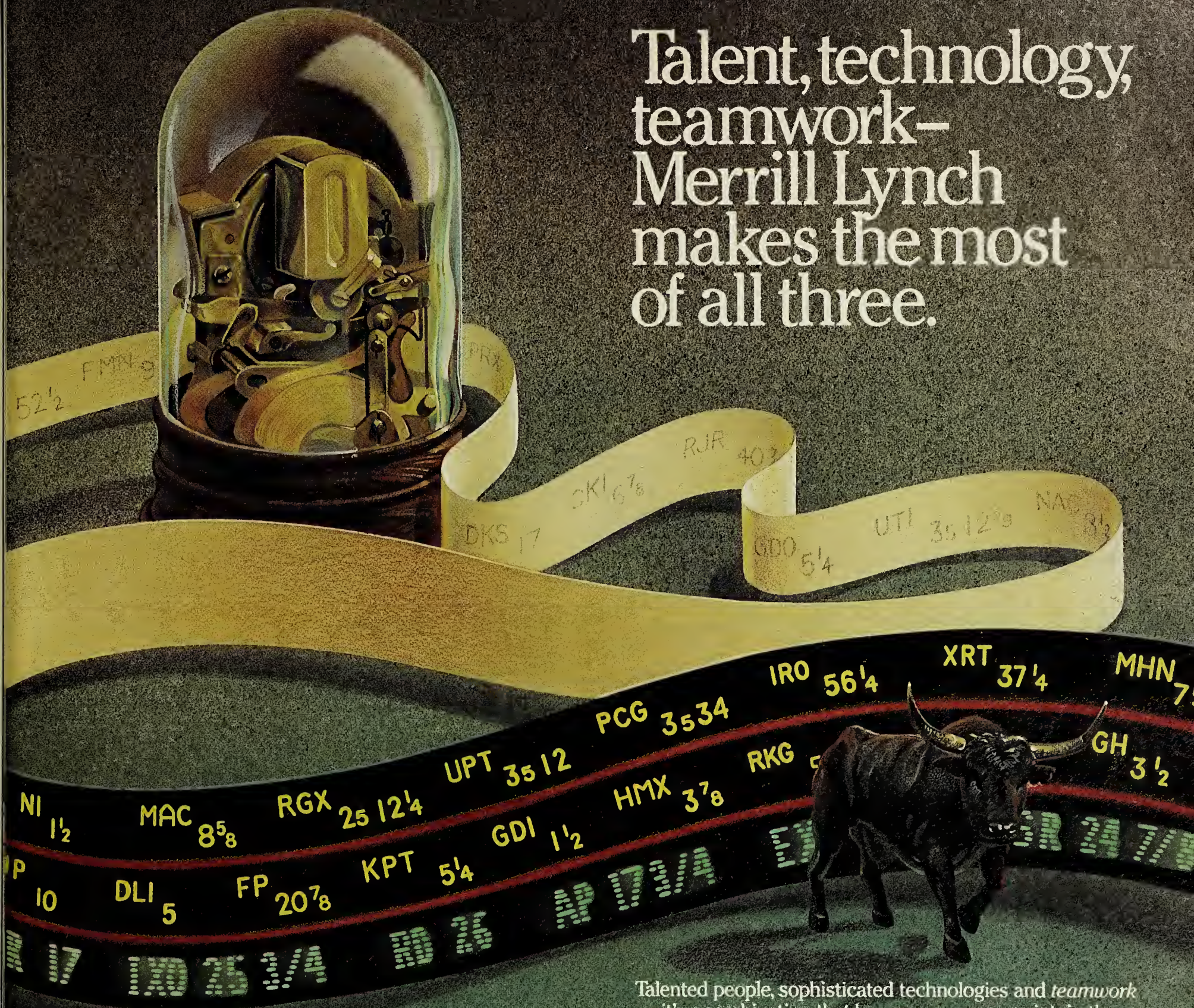
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STEVE LEWIS

Harvard B-school professor F. Warren McFarlan says the best computer-related jobs can be found in financial services, wholesale and aerospace

The most far-reaching change in the world of information systems management during the next five or 10 years may be the blurring of the distinction between careers in IS and general business management. One individual with a particularly clear perspective on this issue and a host of others in IS is F. Warren McFarlan, the Ross Graham Walker professor at Harvard Business School. McFarlan, who specializes in strategic planning and IS, has taught the management of information technology for nearly 30 years. Former Computerworld senior writer David Ludlum spoke with him for the Campus edition.

Q Can you assess the state of IS education at colleges and universities around the country?

A It varies all over the place. We're training people for very different roles. We've got edu-

cation for those who are going to be the doers — database architects, programmers and analysts. And then we've got education for those who are going to manage the departments that are going to be impacted. In general, the more specialized the technology, the better job we do of training people. It's easier to train people to do technical jobs than it is to think through the administrative environment within which the tasks are going to be executed.

Q Is there an adequate job being done in technical training?

A The job is being done better in the technical areas than in the nontechnical. It has a lot to do with career paths. What does a typical MIS professor get trained in? He gets trained in research methodology. He gets trained in computer science. Does he get trained in all the

nuances of applications development and how to make things happen in the real world? No.

Every year, I go to the leading conference of information systems academics. They are different from the people I spend most of my life working with because they are heavily focused on the technology kind of education, and they try to help people think about things in a very hands-on, how-to-make-it-happen way. They aren't very good at business policy or the broad view on how an organization operates and how the technology can be grafted onto it.

Q What advice do you give students interested in going into IS management?

A My advice to those students is this: You don't want to work in a company where IS is not a big deal. Go to a place where the expenditure

levels as a percent of sales are large, where there is very significant value added.

You've got to go to a company where intelligent technology really matters and where there is some *perception* that it really matters so that you don't get caught in some technical backwater of the organization. When something really matters, it reports higher, general managers are more actively involved with it, the compensation levels are higher and there's an ability to talk about your unit's contribution. At American Airlines, it's a big, big deal. Senior management knows it. IS management knows it. It's a great training ground. Citibank — again, a first-rate environment. People understand right from the chairman on down that IS is changing the nature of banking, and attention is spent on it.

What industries do you recommend?

A In financial services it's a big deal in terms of new product development, new channels of distribution. In the wholesale industry, IS can provide a big competitive advantage. In aerospace, there are very complex [computer-aided design and engineering] efforts. Look for places where [technology] is aligned with three or four things that the company has to do right to be successful. That's where the large salaries are; that's where the challenging problems are; that's where you can make a really big impact.

Do you find many Harvard graduate students gravitating to careers in IS?

A My guess is that it's a relatively limited number of people. Most of our students

are going off into marketing or production jobs.

I'm not sure if it might be 5% of the class or 7% of the class that would go into IS management.

Part of the reason is that a number of the IS management positions are filled by people coming right out of the technology side. Two years here doesn't give that kind of apprenticeship.

Our students have a very strong general management orientation. Their interests as they graduate are geared to major positions in profit centers and corporate leadership. It's a much smaller group that aspires to major leadership roles in staff activities like information systems.

Does this mean going into information systems is inconsistent with reaching a position of significant responsibility for a profit center?

A If we look for where successful information systems managers will come from in the early 21st century, we will find them having significant positions in both end-user departments and the information systems function.

They can enter the organization in either way. The key thing is they have to spend time on each side.

Look at it candidly: Student coming out of Harvard Business School carry along with them a \$65,000 debt.

Heavily focused on their minds are career opportunities and jobs that will allow them to extinguish the debt at a satisfactory rate so they can sleep better at night.

It's not clear to me that the compensation levels in information system entry-level jobs are commensurate with those in marketing and certain service management activities.

How much should your students know about information technology, even if they go into general management?

A We've put a very significant shift into our school's curriculum. We think that information technology is one of the major trends of the 1990s, and our core MBA program, as well as every one of our executive education programs, has a significant course on information technology and business transformation.

We don't waste a lot of time teaching people the intricacies of relational data architecture or the technical performance of different kinds of local-area networks because that technology tends to be very specific to a point and time. But in terms of developing an understanding of how the technology is changing organizational structures, how it's allowing new kinds of control techniques to be created, how it's improving responsiveness in the company, how it's opening up new channels of distribution and how new forms of electronic technology enable strategic alliances — those are really big things [and are discussed in a] required course in the first-year MBA program.

For those who do go into IS management positions, what are the challenges they will face in the next five years?

A The first one is the continual forging and maintenance of the partnership between themselves and key end-user constituencies. A second set of issues is helping to identify and work with end users to think about potential ways in which new technologies can be applied. Thirdly, there's a very important focus on simply making sure their organiza-

tions are up to speed in terms of understanding what the new technologies are and how they may impact the company. The final one is the ability to facilitate the transfer of information technology understanding throughout the organization.

What do you think of the prospects for IS managers going on to top-level management?

A In companies where IS is a big deal, it will happen. I'm a director at the Royal Trust Co. in Canada. Our chief operating officer has come out of the information systems function. He's a super high-energy person. He has total command of the technology but knows the rest of the business.

Do you think that's going to become more common in 10 years?

A Yes, because of the kinds of people who are going [into IS] and the diversity of the career path. If you want to be a general manager and you enter the information systems side, you may start as an analyst at a bank, move on as a branch manager and come back as manager of a large systems and programming group. You look for significant management jobs on each side as you move on up in the organization.

I emphasize the word "line jobs" — people who help in dealing with real customers, real problems, feeling real pressure. The people who enter the information systems function who can head large project teams and then gain insight into what it really takes to be successful are the ones who have the careers. ◀

Ludlum is a former *Computerworld* senior writer.

Want that BMW? Specialize!

Niche knowledge is nice, so know your acronyms

By Michael Cohn

When I first started out, just saying you were in information systems was saying a lot. It got you a car loan. Realtors sat up and took notice. Eligible women stalked mall book stores, throwing themselves on unsuspecting souls in the computer section, even when it

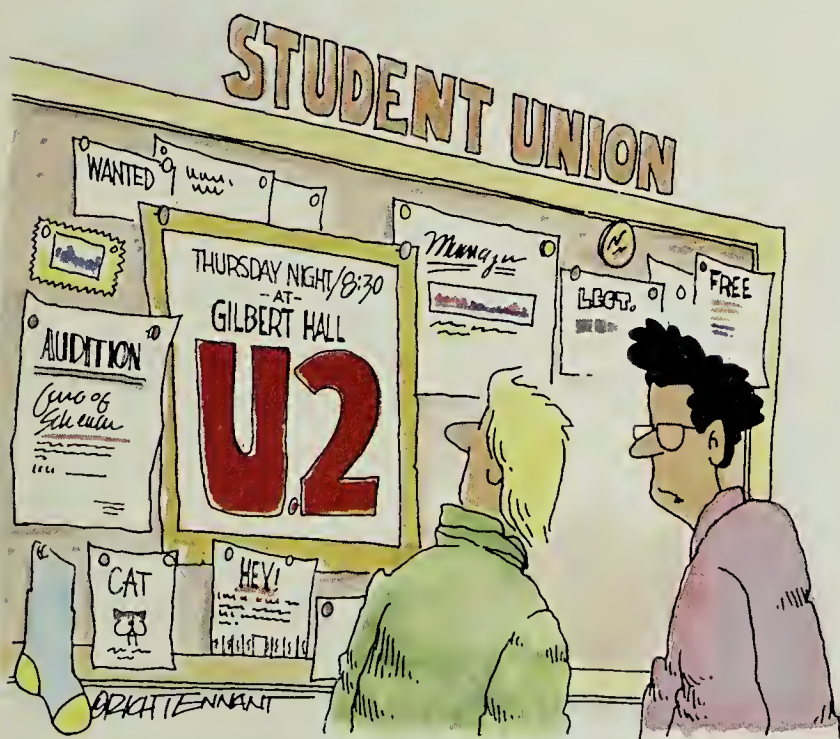
was just a 12-year-old buying Hanukkah gifts for his uncle in Toledo. Believe me, those were the days.

Today, IS has lost its glamour. Everyone knows how to use a computer. Most folks mastered Pac-Man years ago. And Cobol programmers are a dime a dozen, although they still want 60 bucks an hour and a window office.

So let me offer some advice to students at the fine universities and institutes around the globe: You can't just go into IS anymore. You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

If you want to get a great offer, make the big bucks and lease the German-made convertible of your choice, find your niche in the computer field. Before it's too late, consider one of the following:

- **The X fields.** Anything that ends in X is big right now, like Unix or AIX or KIX or TRIX. Just say it with a straight face, and you'll be heading for six digits.
- **Multimedia.** Multimedia is the wave of the future. Companies are racing to integrate video, audio, text and touch screens, all under the control of a single end user. Not only will this change the way we work and use information, but no one will ever have to miss another episode of General Hospital again.
- **ISDN.** ISDN is hot, and everyone is looking for someone who knows what it stands for. Even hotter is TCP/IP. Companies are impressed by any acronym that contains a slash, and you'll definitely get called back for a second interview. But if you really want the whole enchilada, bone up on X.12 or X3S3.3 or anything else that has a period in it somewhere. They're on the top of every employer's list, until someone invents an acronym with a semicolon or two.



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NOTES

AN APPLE FOR THE STUDENT.

► When freshmen arrived at the Des Moines, Iowa, campus of Drake University this fall, they found Apple Computer, Inc. Macintoshes installed in their rooms.

The campus is in the process of installing a digital information network to serve as an information exchange between students, faculty and administrators.

The computers are university owned, but the students pay Drake for their use.

- **NI.** Artificial intelligence is out, natural intelligence is in. Nobody wants that artificial stuff anymore, unless it's less filling or tastes great.
- **Assembler.** No matter what anyone says, there is still a need for assembler programmers — primarily so they can teach assembler.
- **JEDI.** EDI is already passe. Everyone in the Fortune 1,000 who wants electronic data interchange has got it by now, and data interchange specialists are being laid off by the truckload. The new field is JEDI, or Junk EDI, which involves figuring out ways to electronically transmit coupons for aluminum siding or pictures of Ed McMahon.
- **Computer security.** Computer security is the brightest field in IS. Companies spare no expense protecting themselves from hackers and unauthorized access. The sky's the limit for specialists who can learn and control every detail of corporate assets, security algorithms and vital financial data. Best of all, these positions tend to have remarkable job security, for some strange reason.
- **Computer engineering.** There's a tremendous shortage of computer engineers. People still think computer repair means being glued to a beeper and working all hours of the night. Companies are aggressively trying to shed this outdated image and are paying top dollar for good technical people. In fact, hardware maintenance is the top priority of technical recruiters

You can't just go into IS anymore. You have to specialize. Companies no longer drool over anyone who says "hexadecimal" in an interview.

today — that and finding technicians who know how to fix beepers.

• **The Big Eight.** The Big Eight is always looking for entry-level IS consultants. Sure, the hours are brutal, the travel is hell, and you work like a dog just to move up the ladder. But with a little patience, you'll soon be working for the Big Six and then the Big Four, and at least it will seem like you're getting someplace.

• **Contract programmers.** Despite the gluts and layoffs in other industries, contract programming continues to flourish. IS managers are always trying to find contract programmers — especially after 4:30 p.m. when their cars disappear from the parking lot. ◀

Cohn is trying to be a computer salesman in Atlanta.

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The dormpreneurs

High-tech hotshots who launched lucrative careers from campus

By Alan J. Ryan

Three years ago, Justin Boyan entered the University of Chicago as a freshman. He was also chairman of his own company. Today, barely in his 20s and a senior mathematics major at the university, this "dormpreneur" is working on Version 5.0 of his own homegrown communications software package. He says he has earned enough from his business to pay for his education.

What it takes to be an entrepreneur, Boyan says, is a lot of stamina, the ability to withstand rejection, persistence and a good product. Other successful computer industry figures who opted to start their own businesses during or instead of college agree.

At age 34, West German native Andy Bechtolsheim's resume is simple: He arrived in the U.S. as a student in 1975, earned a master's degree at Carnegie Mellon University, began a Ph.D. program at Stanford University, constantly toyed around with computers, dropped out of Stanford and helped found Sun

Microsystems, Inc.

Did Bechtolsheim make the correct choice in forsaking his Ph.D.? If Sun's success is any indication, the answer is a resounding yes. Sun's 1989 revenue was \$1.7 billion with earnings of \$60.8 million.

Boyan's business, Boyan Communications, had a more modest beginning: He started it in October 1986 from his home in Columbia, Md., while still in high school.

"I had a modem, but I was too poor to buy any communications packages," Boyan says. He began using shareware programs that were available through bulletin boards, but even these did not satisfy his needs. "So I started writing my own software, and the program



MICHAEL DELL found early sacrifices had later payoff

WILL VAN OVERBEEK



DAVID JOEL

JUSTIN BOYAN had stamina, an ability to withstand rejection and a good product

kept growing," he says. Boyan began marketing his Boyan Communications software for IBM Personal Computers and compatibles as shareware when he was a senior in high school.

To date, Boyan has sold 2,000 registered copies of the package, known as Boyan. The software sells for \$40 and was on *PC Magazine's* "Best of 1987" list.

SCHOOL'S OUT

Not all dormpreneurs start their ventures while they are in college or high school, however. Some drop out to get going,

while others begin immediately after graduation.

"A good time to start a business is right after you finish school, because you're used to living like a student," says Dan Bricklin, a software entrepreneur who has founded three separate companies.

Bricklin created the successful commercial software spreadsheet program, Visicalc, while he was in his late 20s and was still a student at Harvard Business School.

An enterprising individual who decides to work for someone else before starting a

business may have a tough time starting a business later on, Bricklin says, because most people find the spartan student lifestyle tough to go back to once they've left it.

Michael Dell, who founded Dell Computer Corp. at age 19, agrees. He says that when he dropped out of the University of Texas after his freshman year to start his own business, he was able to get by on a salary of \$20,000 per year.

However, early sacrifices can have future paybacks. Today, 25-year-old Dell is chairman and chief executive officer of a company that pulls in nearly \$500 million annually. His personal wealth is estimated to be approximately \$60 million.

Dell says he did not wait to finish school before making his mark on the world because he saw an immediate need in the market for a business in which PC users could buy add-ons and upgrades without having

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"A good time to start a business is right after you finish school, because you're used to living like a student."

Dan Bricklin

Software entrepreneur

to pay high mark-up prices. His solution: mail order.

Today, Dell's company sells complete PCs through the mail.

Bricklin, who is currently vice-president at software vendor Slate Corp. in Cambridge, Mass., says that while a young entrepreneur may not have much experience in dealing with the business side of starting a company, "life is a good teacher."

Boyan agrees. "There are a lot of business aspects to this I've had to learn about — sometimes the hard way," he says. For instance, he adds, "I know a lot about copyrights and postal regulations now."

Still, Dell says, things have a way of coming together if you're cut out for the role of entrepreneur. "If you have to read how to succeed, if you have to ask somebody, if you have to go to lots of classes or seminars," then you might not have what it takes to start your own business, he

says. "It's a gut feeling — at least that's what it was for me."

However, even those who do possess the entrepreneurial spirit learn that starting a business is not easy. Sometimes, Dell says, getting a business off the ground when you are young is more difficult because people do not always take you seriously.

When Boyan started out, he says he wrote letters to authors of other communications programs to share his ideas on what kinds of things such programs should include. "I didn't get any feedback," he says, "so I just jumped into it myself."

Dell adds: "You have more energy and ability when you're young. The hours I worked when I was starting out — lots of people said if I were in my 40s, I would not have had the same level of energy. But I haven't gotten there yet to find out if that's true."

Boyan admits he's been through some rough times, especially in trying to balance business and school. "I always feel as though I'm not devoting enough time to one or the other." Filling the orders is manageable, he explains, but finding time

Breaking in is hard to do . . .

The entrepreneurs we talked to said that lots of great ideas for the computing industry came to them while they were sitting in classes, but it was not always the classes that inspired them — the most important inspiration comes from inside. You have to know whether you have an entrepreneurial nature. Are you a leader, or do you feel more comfortable taking direction from others?

If you are a leader, read on for some do's and don'ts from successful entrepreneurs:

- **DO** go with your gut instincts.
- **DON'T** hesitate when opportunity knocks. If you have an idea worth exploring, don't wait until you finish college or graduate from school, because someone else may have the same idea.
- **DO** take classes to learn how to run a business.
- **DON'T** try to push an incomplete or substandard product into the market just to be first.
- **DO** solicit advice and feedback from people you respect and trust.
- **DON'T** count on getting rich overnight.
- **DO** get used to rejection from others. Fellow students, companies, loan officers, venture capitalists and even potential employees may scoff at your ideas.
- **DON'T** rest on your laurels once you start to succeed. Keep pushing for more fresh ideas so your company can grow and mature.

ALAN J. RYAN

S O O N - T O - B E G R A D U A T E S

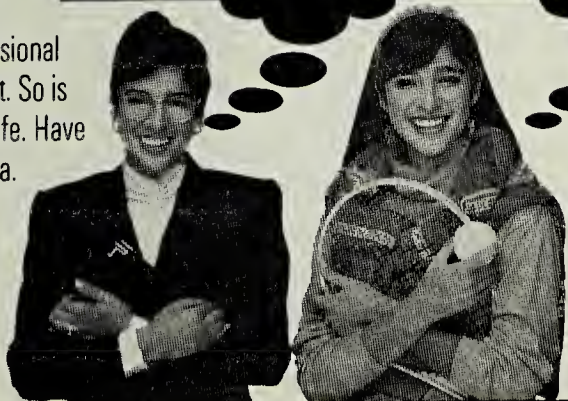
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to continually update the code to meet ever-changing telecommunications requirements, such as high-speed modems and new protocols, is challenging. Boyan's time may be even more in demand in the future; he plans on pursuing a graduate degree in computer science.

Young people, however, typically have fewer commitments and may bounce back more easily if their businesses do not pan out, Dell says. "You have less to lose and probably don't have a family relying on you for support," he says.

One business started by students that did pan out — and which has been profitable every quarter but one since its inception in 1982 — is Unix workstation vendor Sun.

Bechtolsheim, Sun's vice-president of technology, helped to found the firm with Scott McNealy, currently president and CEO, while Bechtolsheim was a Ph.D. candidate at Stanford. At the time, Bechtolsheim had job offers from other companies, but none seemed to understand the workstation market, he explains, "so I figured I was better off doing it myself."

Today, Sun is looking to other entre-

Young people typically have fewer commitments and may bounce back more easily if their businesses do not pan out.

Michael Dell
Dell Computer

preneurial minds, including those of students, Bechtolsheim says. "We are setting up a new laboratory where we want to work with people who have good ideas about good future products," he says. In charge of the laboratory is Bill Joy, vice-president of research and development, who joined Sun just days after the company's inception. Joy came from the University of California at Berkeley.

Bechtolsheim says that in the competitive environment of the 1990s, it might be nearly impossible for anyone to start an-

other hardware company such as Sun. "We have 2,000 engineers at Sun, which is an incredible investment," he says.

However, there are markets, such as software, that entrepreneurs can get into with little or no venture capital. "The whole infrastructure cost of buying the tools and the platform can often be done by putting a second mortgage on your house," he says. A good programmer could probably write an interesting software package in a year, he adds.

Students who are looking for large markets and big dollars at the start may be overlooking lots of opportunities, Bechtolsheim says. For instance, Sun will likely ship 150,000 to 200,000 of its Unix-based workstations this year; a student who can sell a package to just 5% of Sun's installed base would be doing quite well.

"The people who really do well are those who feel there is a problem to be solved and who really push the thing forward," as opposed to those who are looking to get rich quick, Bechtolsheim says. ◀

Ryan is a *Computerworld* senior writer.

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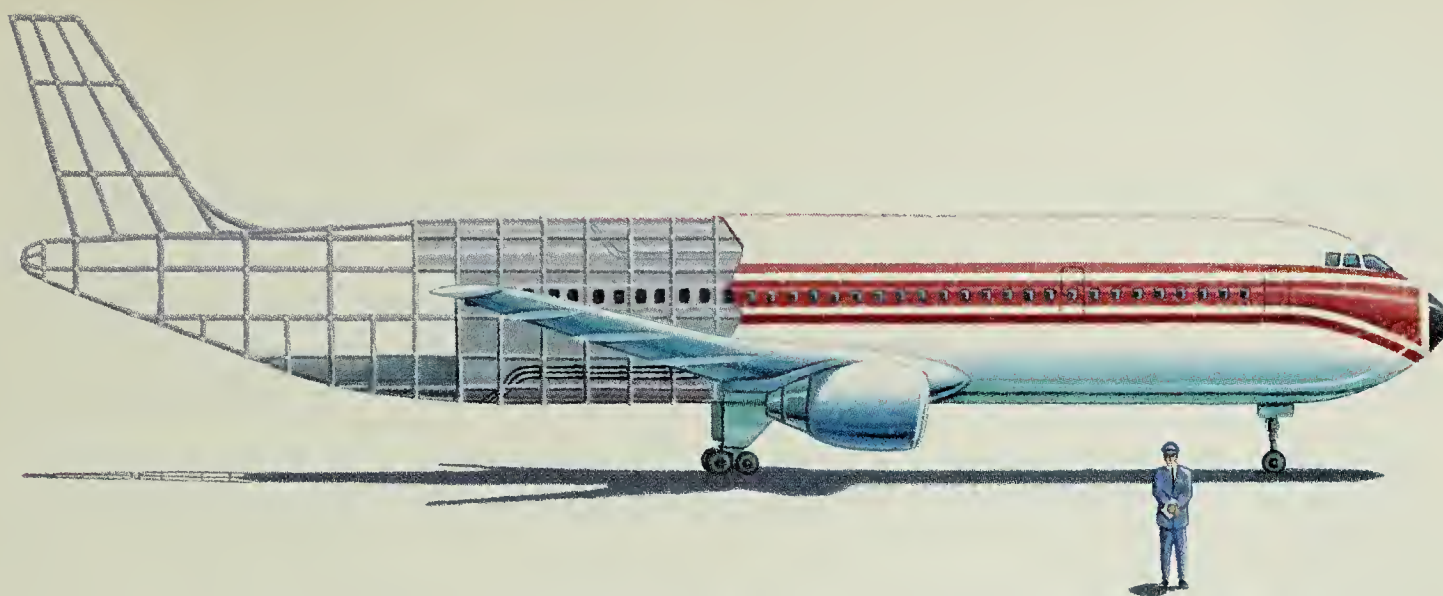
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GLENN REID

From circuit boards to the IS circuit

"In engineering school," Ricardo Fishman says, "they don't tell you that you need a broader view of the world." Significant words from the 24-year-old Fishman, who holds a degree in electrical engineering (EE) from Boston University. Fishman's sentiments point to a subtle and steady trend: A small percentage of EE graduates are being drawn to information systems careers because they want to be more involved in the business side of the technology. They say they want to move into positions where they can use their technical knowledge to influence corporate direction.

For Fishman and other EE students, the path into IS is neither simple nor well beaten, but it has all the earmarks of becoming one of tomorrow's most popular tracks.

For his part, Fishman, who lives in Allston, Mass., complemented his regular EE course load with offerings outside of the department — courses such as technology strategy, engineering economy and international finance and accounting.

A native of Venezuela, Fishman says he wanted a better understanding of how business is conducted in the U.S. He says he found the EE program to be too focused

on the technology and on chip- and board-level learning. Seeing technology's broad view and strategic side were key for him, as was learning about technology's implications for engineering. In this sense, Fishman says, he didn't think EE was going to be fulfilling for him.

"In the real world, there's a tremendous gap between the engineering community and the business community. The business community is definitely dominant because it has the power that comes with bottom-line financial control," Fishman explains.

James Bruce, a professor of electrical engineering at MIT, acknowledges that there is still a lack of coupling between formal degree programs and what IS requires.

"We're always going to have a lot of discontinuity between someone's educational background and IS," he says. Bruce, who is also vice-president of IS at MIT, says he hires electrical engineers from MIT and elsewhere to work in the school's IS department but adds that there are still a lot of people coming into the IS profession from a wide variety of disciplines.

"What we're really interested in are their accomplishments in information technology areas rather than a specific

Interested in influencing corporate direction, electrical engineering majors are crossing over to IS positions

By Kathleen Gow

STUDENT PROFILES



Sean Joseph Walsh
Age: 24
► Bachelor's, business administration and finance, Texas Tech University, Lubbock. MBA in information systems, Texas Tech. ► "I'm currently working for Pepsi Cola, Inc. in Albuquerque, N.M., as a distribution management trainee. In 10 years, I would like to be the VP of operations of some area in Pepsi."



Patricia Ramatowski
Age: 38
► MIS major, Southern Illinois University, Edwardsville. Master's, information management, Washington University, St. Louis. ► "I work for a Department of Defense agency as a programmer/analyst. I would like to advance into an information management position."

degree path," Bruce says.

Electives and part-time jobs are an important consideration. A student with a part-time job maintaining Unix systems, for instance, would be well prepared to enter the software community, Bruce says. "The bottom line is, there's no such thing as a standard EE degree," he says.

While MIT's IS department hires electrical engineers straight out of school, it is rarely an easy transition. Dave Berlien, college relations supervisor for business and computer systems staffing at Du Pont Co. in Wilmington, Del., says his company doesn't hire electrical engineers for systems jobs. Instead, Du Pont is looking for computer science and IS majors.

Berlien says he has been happy with systems engineers from the University of Virginia, computer engineers from Ohio State University and computer technology graduates from Purdue University and the University of South Florida: "We like those candidates because they are very applications-oriented and have a lot of project experience. It's a good fit."

He admits, though, that because the IS area is a new one and has been exploding in size during the last few years, Du Pont ends up taking people from many different fields.

Berlien notes that hundreds of EEs work in Du Pont's systems departments, but most of them have been in the work force for a while. "It's on-the-job training. These employees bring with them strong technical backgrounds. A lot of them have been involved in manufacturing, worked out in plants and understand that side of the business," he says.

Michael Ferone, personnel representative at NCNB Corp., says his organization has hired EEs in the past for IS jobs, but it doesn't seek them out: "We don't want strictly technical people. We want people with more of a business background who can communicate with users."

NCNB would consider electrical engineers along with computer science grads for systems jobs, Ferone says, but the bank looks carefully for strengths such as leadership, communication skills and involvement in extracurricular activities.

The need for strong communication skills as a requirement for entering IS, especially management, was echoed by Robert Gallagher, director of information technology services at Rensselaer Polytechnic Institute (RPI) in Troy, N.Y. The information business is so dynamic, Gallagher explains, that people working in the field have to be receptive to learning new things. "If they resist change, they will become obsolete, and opportunities will be limited," he says.

Bruce adds that a large number of RPI students get MBAs after earning a bachelor's degree in a technical field and are well suited to understand technical and business issues. The job seekers that successfully move from electrical engineering into IS often acquire a more business-oriented degree to help make the switch.

"If a company sees an EE who's gotten an MBA,

that shows where the person is headed," says Jim Scimone, managing director at the Wellesley, Mass., branch of Source EDP.

While Scimone says he does not see a major movement of electrical engineers toward IS careers, he does see a growing trend of traditional service companies looking for software engineers to develop communications software.

Steve Nichols, a student at Texas Tech University, says combining a business degree with a technical undergraduate degree is the wave of the future. "A lot of engineers are doing it because they realize it's important to see both sides of the business," he explains. Nichols started an MBA/MIS degree program after finishing his undergraduate degree in EE technology.

After he completes his degree, he will work for Sandia National Laboratories as a programmer and analyst. Nichols says he is sure he would not have been considered for the position at Sandia based solely on his EE degree.

"We don't want strictly technical people. We want people with more of a business background."

Michael Ferone
NCNB Corp.

The mix of engineering and MBA programs was a boon for Nichols. The engineering program forced him to do group work, while the MBA program forced him to give frequent group presentations, which has been important for building his communication skills. Furthermore, the exposure he has gained from marketing, management and finance courses has given him a better understanding of business and other people's needs.

Boston University graduate Fishman, however, says that his technical degree, coupled with his jobs at two technology consulting firms, gave him an edge over his more business-oriented co-workers for consulting and selling. "For instance, if we were working for a manufacturing firm that was trying to integrate systems in different places, I could ask the right questions. My colleagues often didn't understand the technology, so it took them longer to come up to speed," he explains. "An electrical engineering degree made my life easier — better than an MBA."

As for the problem of building a background that meets the industry's needs and selling it to employers, Fishman is realistic: "People expect EEs to develop hardware or do software maintenance support. If you want to get into something else, it's a matter of marketing yourself and having the right attitude." ◀

Gow is a free-lance writer based in Medford, Mass.

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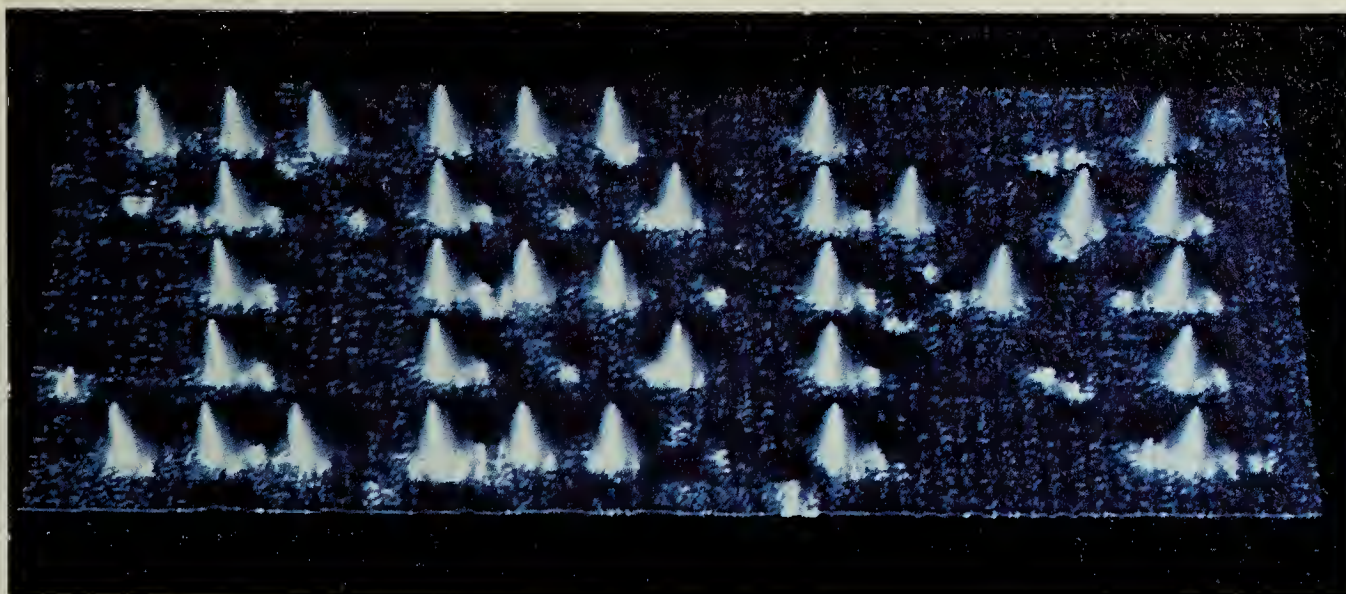
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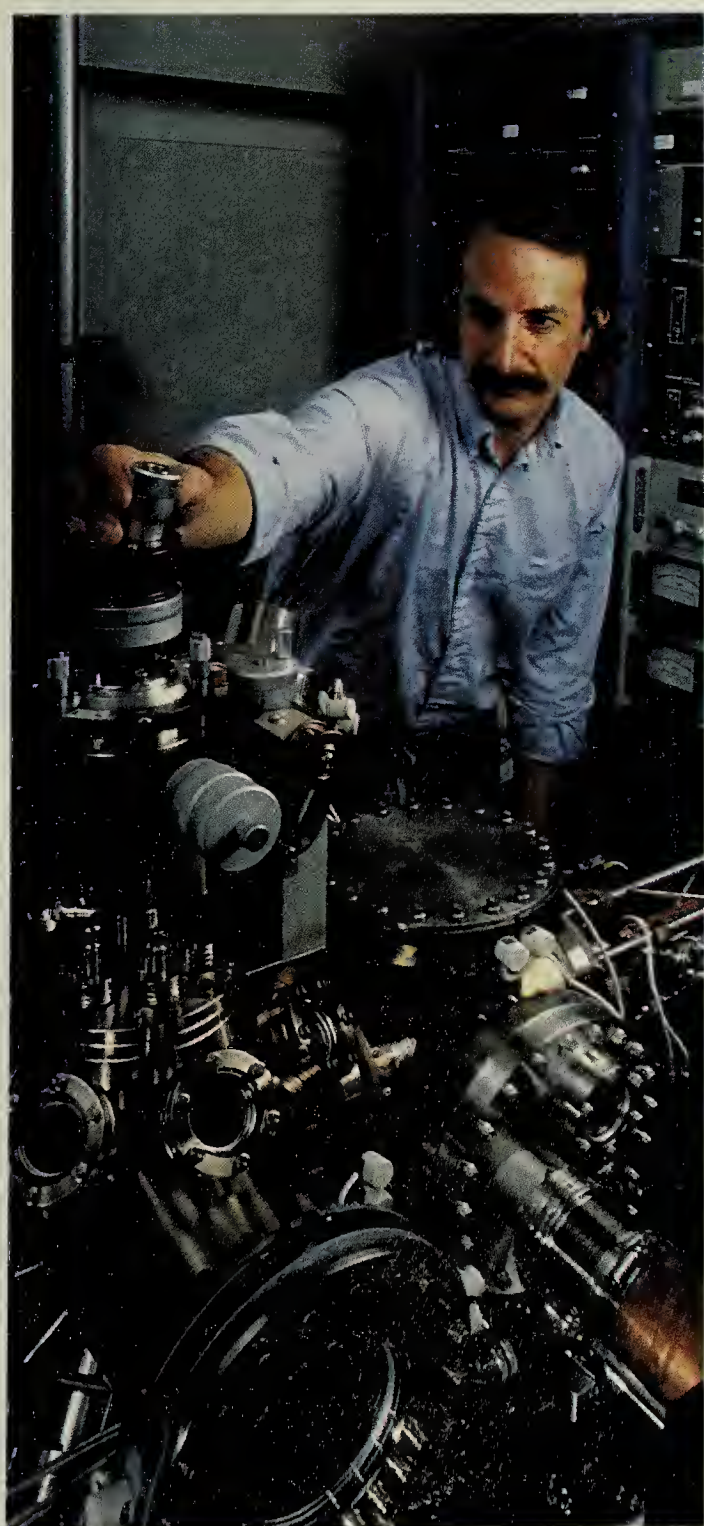
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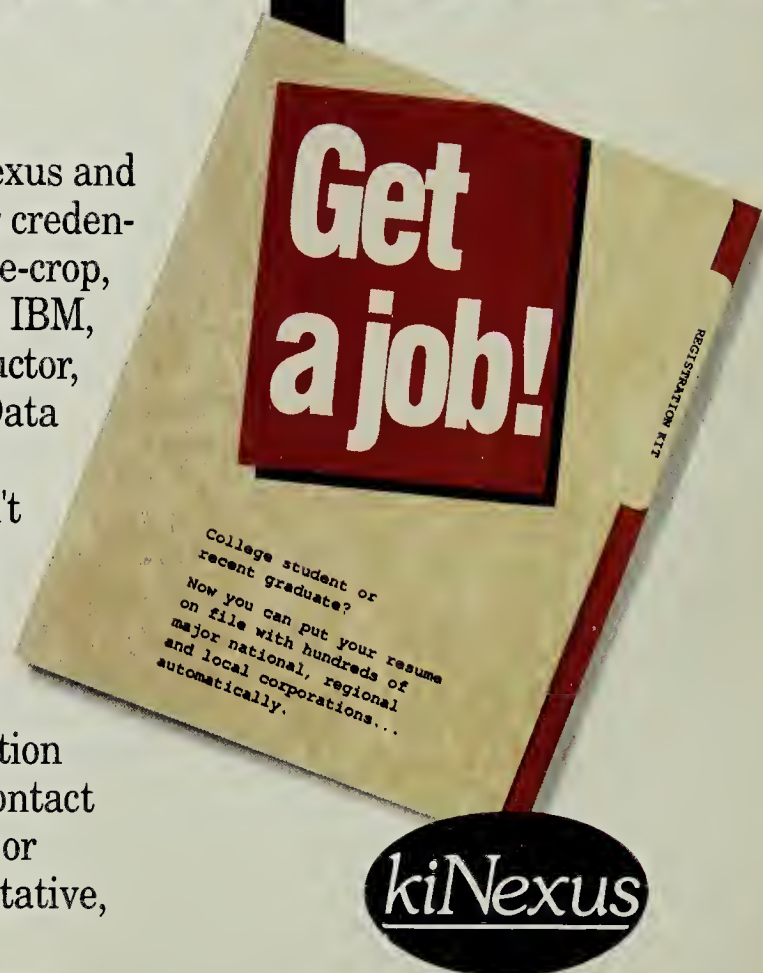
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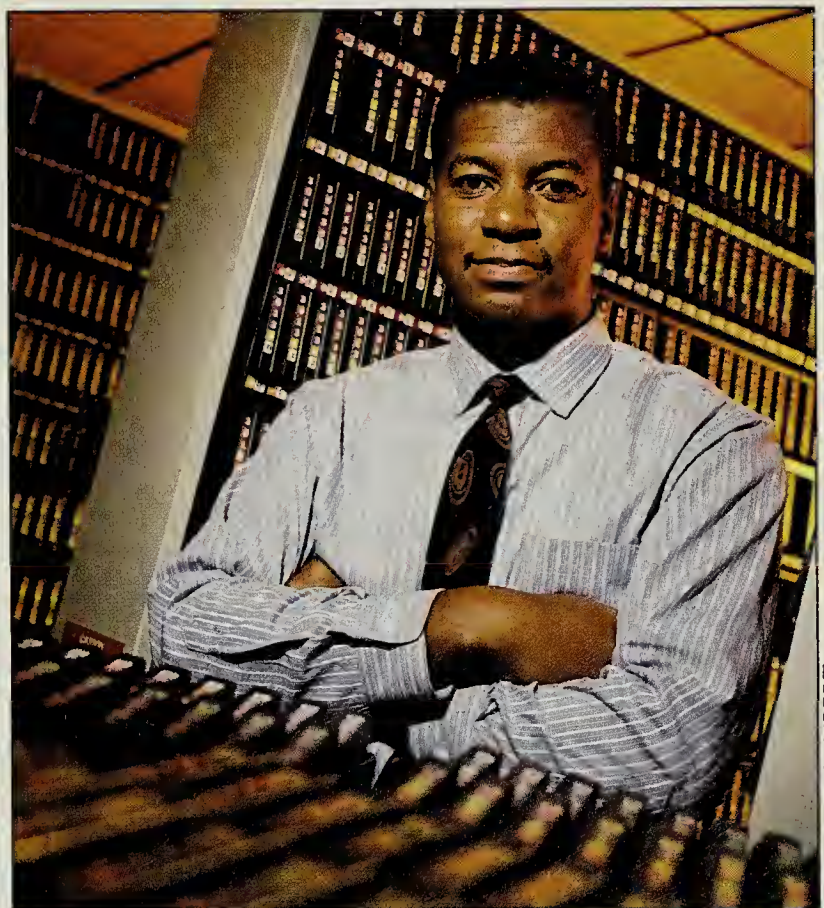
By Amiel Kornel

At first glance, Robert Henderson's future seems assured. Hard-working and dedicated, he has advanced his career in information systems at a fast clip. In the dozen or so years since landing his first job as a night computer operator for an insurance company, he has risen to become IS project manager at a food distributor, managing teams of up to 18 programmers and analysts.

Henderson worries, however, that further career opportunities may be limited. As a 29-year-old black man, he fears being shut out of the senior management ranks of a profession that is overwhelmingly white.

"I'm at a point now," Henderson says, "where it's going to be very hard for me to move up any further." Line management, he suspects, marks the end of the line for a black man carving out a career in IS. "We are not the ones typically in the VP of IS positions," he notes.

His concerns are well founded. Computer professionals, academics and recruiters say minority men and women rarely attain the highest ranks of information systems management. Although they are



KATHERINE LAMBERT

ROBERT HENDERSON worries that his career path may be limited by color barriers

one of the symbols of modern progress, computer careers appear to be anything but color-blind.

"The field is attracting blacks, but not in the numbers it should be," acknowledges Vivian Wilson, president of Black Data Processing Associates (BDPA). "Information processing requires a strong background in statistical, mathematical and science disciplines, and minorities are generally not strong in these areas in school." As a result, young minority students often hesitate to embark on a career path that might simply lead to a dead end. This compounds the problem by keeping the pool of minority IS job candidates low.

"Your chance of experiencing great rewards is probably not as good as in other professions," says Bob Mathews, a black systems manager who is Henderson's boss at Richfood Holdings, Inc.

NOTES

REGISTER BY PHONE

► Students at the University of Pennsylvania will be going to PARIS this year to avoid registration lines. PARIS, the Penn Automated Registration Information System, allows students to register for their classes from their dorm rooms with a touch-tone telephone.

Students can dial into a computer, and a mechanized voice walks them through the process. By using the phone as a keypad, the callers can be registered for their classes within five minutes.

"It's very hard to break into the bastion of white male dominance," says Beverly Lieberman, an executive recruiter at Halbrecht Associates.

The pattern of exclusion is not reserved for blacks. Asked what affect being Hispanic has had on his career, Nicaragua-born Julio Guillen, IS manager at Bio-Rad Laboratories in Hercules, Calif., says, "There are probably certain situations when promotions have gone elsewhere."

According to Equal Employment Opportunity Commission figures, progress for minorities has been at a virtual standstill at the high end of the computer career ladder. In 1988, 92% of IS managers were white and 8% were minorities — the same percentage split found in 1980 and 1985 (see chart page 41).

WOMEN ARE SCARCE

The problem is particularly dire for minority women. When Halbrecht Associates was asked to recruit a minority woman as IS director for a big organization in New York, its nationwide search turned up only six potential candidates, Lieberman says.

"Compared to other business functions, there are a fewer number of minorities interested in information technologies," says James Senn, director of The Information Technology Management Center at Georgia State University in Atlanta.

For those minorities who do enter the field, climb-

Although they are one of the symbols of modern progress, computer careers appear to be anything but color-blind.

ing the corporate ladder requires working extra hard to overcome doubts that some colleagues may have about their abilities. "I make sure that I perform at at least 120%," Henderson says. "I make sure that I break every kind of stereotype that anyone may have."

According to Chet Holmes, an account manager at Candle Corp. in Los Angeles who started his career in IS, many blacks are interested in the profession, but few move up quickly. "What keeps many blacks from moving forward is not being able to identify a mentor within the department," Holmes says.

Wilson agrees and points out that her organization, with a national membership of 1,400, is actively working to encourage its members to become mentors to high school and college students. BDPA sponsors a national competition in computers and information processing for high school students and gives scholarships to winners. This year's competition involved more

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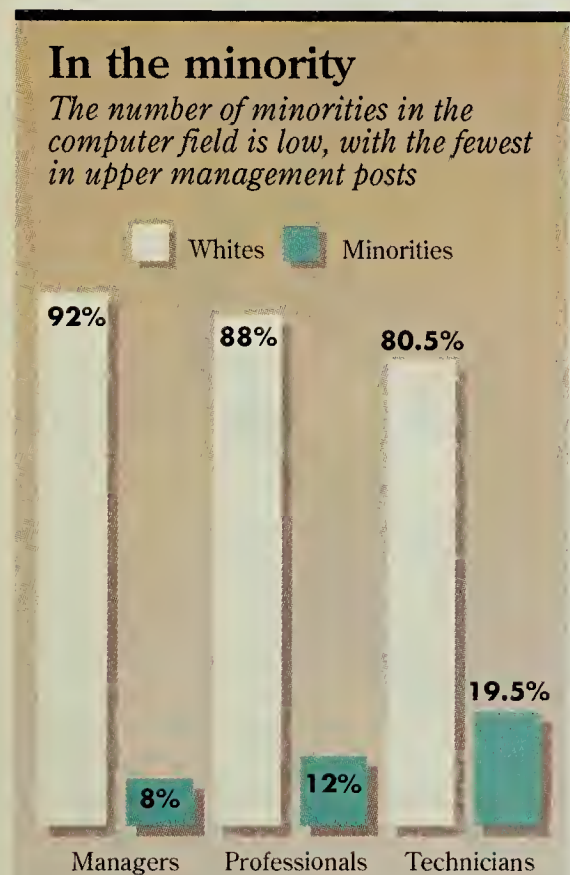
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than 1,500 students in 18 cities. "The idea is to expose students to what it is like to work in this field and encourage them to go on to college with this in mind," Wilson says. "In this way we act as role models."

Minority IS professionals report that their achievements and failures are often magnified in the eyes of white management. "They expect you to be more on the ball," says Debbie Gore, a black information security administrator at Federal Mogul Corp. "You have to prove yourself."

This intensive scrutiny, however, can be a benefit, she says: "If you end up getting a reputation for being very good, things move your way."



Source: Equal Employment Opportunity Commission

"I consider my Asian background as an asset," says Duc Won, Korean-born president of Applied Systems Institute in Maryland. He says he has gained an aura of competence because Asians are viewed as gifted in technology-related areas.

Although some Asians say being characterized as technologists can become a liability when later seeking a management position, Ann Li, corporate vice-president at Paine Webber, Inc., says the problem is faced by "anyone who is a techie."

Nonetheless, the question remains: Why have so few minorities broken into senior management positions in one of the fastest growing professions?

Part of the answer, no doubt, lies in the intolerance bred by age-old prejudices. Blacks, Hispanics and Asians interviewed for this story, however, insist that they've

rarely experienced open hostility and prefer using euphemisms such as "color sensitivity" and "traditional attitudes" when talking about what in an earlier era would have been simply labeled racism.

"You can't blame anyone for a mind-set that has been around for a couple of hundred years," Henderson says.

Minority professionals assert that their career advancement depends on their skills at least as much as on their race. Minority IS professionals also cite some of their own cultural traits and traditions as potential obstacles in their efforts to climb to executive IS positions. They say these must be modified before climbing the IS career ladder becomes possible.

Jauruey Chew, a network switching director at US West who was born in China, notes that Asian culture emphasizes unquestioning obedience and silence, traits that are an anathema to U.S. management technique. "The American corporate environment is interested in having people take the initiative," she says. Chew, who oversees the work of a staff of nearly 400, has clearly learned to adapt.

For young blacks and Hispanics, a lack of role models in science- and engineering-related fields can pose a problem. While accounting for 10% of the total work force, blacks held only 2.2% of the nation's science and engineering jobs in 1986, according to a recently released report by the National Science Foundation.

"Normally, in a black household," Henderson says, "it's very rare to find a college-educated black man who had anything related to a scientific training." He says he hopes his experience and that of

Minority IS professionals report that their achievements, like their failures, are often magnified in the eyes of white management.

other minorities will change that. "We're starting the tradition now," he says.

Educators are also paying closer attention to providing minority students with the math and science training they need to prepare for a career in technology. In the Washington, D.C., area, big businesses are funding an all-minority program in which 600 to 700 students are receiving help in developing their math and science skills, according to Lynford Lautz, executive director at the Fairfax County Public Schools Education Foundation.

Such measures leave room for hope, IS professionals say. As attitudes change and training begins to bear fruit, minorities may finally appear in greater numbers at all levels of IS. "Sooner or later," Gore says, "the walls have to come down."

More information can be obtained from the BDPA by calling (800) 727-BDPA.

Kornel is a former *Computerworld* features senior editor and is enrolled at MIT's Sloan School of Management.



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BIG INNOVATION ON CAMPUS

By Alan Radding

Colleges are at the forefront of technological advances

Your music course, chemistry class and language lab are showcases of multimedia computer pyrotechnics. The campus electronic mail system is so advanced, it makes even seasoned corporate network managers envious. And that tweedy, head-in-the-clouds philosophy professor of yours is hard at work programming interactive hypermedia courseware.

Surprised? Some of the most advanced and exciting computer technology developments are currently taking place on college campuses. "Universities and colleges have always led the way in innovation," notes Bill Graves, a mathematics professor at the University of North Carolina in Chapel Hill and director at the Institute for Academic Technology, an IBM-funded organization that provides fellowships to professors working on innovative academic computing projects.

Much of what students experience today by way of computer innovation on campus, Graves says, will become commonplace in the corporate world tomorrow. Computer science, information systems and electrical engineering students already accustomed to interactive multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

The breadth of computer innovation on campus is startling. A conference on academic computing earlier this year highlighted over 100 college campus comput-

er projects, covering everything from economics to geophysics to clinical psychology to music.

This innovative activity has been spurred in part by the large amount of money being poured into college computing. IBM alone spent almost \$600 million during the last five years, says L. G. "Buzz" Waterhouse, IBM's vice-president of academic IS in Milford, Conn. During that period, colleges launched over 3,000 IBM-supported programs. Other major computer vendors such as Digital Equipment Corp. have also aggressively supported college computing efforts.

Vendors are attracted to academic computing for more reasons than just the potential profit of selling computers to colleges, although Waterhouse concedes that colleges are "an important market for our products." IBM also sees the academic community as a leading source for patentable research, the front line in the development of industry standards and a strong influence on the direction of government and corporate

computing. Colleges were quick to recognize the potential of the computer — particularly the personal computer — and as a result, “personal computing is very widespread,” notes Kenneth King, president of Educom, a Washington D.C.-based organization involved in computing and communications in higher education.

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery, according to King.

So far, networking has attracted the big

money and the greatest interest from the corporate world. “Some universities are going into their third generation of networks,” King reports.

At these schools, campuswide Ethernet networks are already obsolete, superseded by 100M bit/sec. fiber-optic local-area networks. Campuswide networking itself is a fact of life at the top 200 or so universities, he estimates, and worldwide inter-networking between campuses is already well established.

Project Athena, a massive multivendor networking effort at MIT in Cambridge,

Mass., is one of the largest and best known college computing efforts.

The goal of Athena since it began in 1983 has been to create a single campus-wide network using equipment from different vendors, according to Janet Daly, a Project Athena information officer. Students and faculty would need to learn only one operating system and could access any application or system anywhere on the network.

Before Athena, the campus was divided into many different computer systems, each from a different vendor, and users couldn't move easily — if at all — from system to system.

IBM and DEC committed a total of \$50 million in equipment and maintenance to the effort, along with five staff members each. MIT pledged to raise another \$20 million. Although originally intended as a five-year experiment, the partners agreed

Students already accustomed to interactive, multimedia presentations and ubiquitous, campuswide networks will likely be one step ahead of the companies they join after they graduate from college.

to extend the project three more years because courseware took longer to develop than expected.

POPULAR ITEM

Today, Athena has 9,400 users who access the system at least twice each week. As of March 1990, more than 92% of MIT's undergraduate and 55% of its graduate students were using it. Athena currently handles about 1,000 Unix workstations on a network designed to accommodate up to 10,000 machines.

What is extraordinary about the project is the number of technologies that have passed through Athena on their way to widespread computing acceptance. For example, Athena is recognized as having pioneered heterogeneous (multivendor)

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distributed computing. It helped establish Unix as the leading open operating system. The X Window System, a graphical user interface, as well as Kerberos and Hesiod network services (for security and file naming, respectively), are also Athena offspring.

Other Athena-like projects have cropped up on campuses across the country. At Carnegie Mellon University in Pittsburgh, the system is called Andrew, another IBM-supported effort. Andrew began as a mainframe time-sharing system but eventually evolved into a "marriage of time-sharing and PCs," an Andrew staffer says.

Today, Andrew appears to its 9,000 users as a giant, seamless Unix file system that even reaches out to other schools. In effect, it is a nationwide file server.

FROM COLLEGE TO THE REAL WORLD

Andrew has had an impact on the corporate environment. For example, the Open Software Foundation in Cambridge, Mass., selected the Andrew file system as part of its distributed computing specifications. The Andrew file system itself is being marketed as a commercial product. Andrew is the base of the University of Michigan's Institutional File System (IFS), an effort to create a massive, heterogeneous network built around an IBM mainframe as a central file server.

The scale of the project is staggering: IFS currently handles 15,000 desktop computers (8,000 Apple

Computer, Inc. Macintoshes, 2,000 Unix workstations and the rest DOS and OS/2 PCs), but IFS designers expect to accommodate as many as 30,000 desktop devices by the mid-1990s, says Ted Hanss, IFS project manager.

Communication is carried over a fiber-optic network backbone linking 75 buildings around Ann Arbor, Mich. The system is expected to be up and running this fall for the 6,000 students and faculty members who will be its first users.

Projects such as Athena, Andrew and IFS, despite their scale and complexity, are actually low-level tools that facilitate communications and make computer use easier. Much more campus innovation is taking place at the application level, where instructors are developing their own computer courseware. These applications make increasing use of the interactive multimedia capabilities of the latest PCs.

"Students learn through multimedia," Graves says. With desktop computers powerful enough to accommodate digitized sound and full-motion video in a Windows environment, he explains, professors have the tools to create very effective courseware. The result can be a learning experience unlike anything that can be done through conventional classroom and lab techniques.

For example, an interactive chemistry videodisc is available that creates dramatic simulations of what

NOTES

SHORT FUSES.

► Computers in dorm rooms are becoming as common as refrigerators and televisions, according to a recent survey of 200 Davidson College students in North Carolina. *The New York Times* reported that 92% of the respondents had a computer in their rooms.

Of the top nine favorite dorm-room appliances, computers ranked sixth behind clocks, lamps, stereos, hair dryers and refrigerators. Curling irons, irons and hot pots followed.

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happens when certain chemicals are mixed — events that no person wants to encounter in a real-life laboratory.

Other such innovations include:

- **Parlez vous computer?** Jim Noblett, a professor of linguistics at Cornell University who is currently on a fellowship at the Institute for Academic Technology, uses the computer for language instruction, making the audio language lab seem primitive. To teach French, Noblett combined a bilingual dictionary with a word processor, creating Systeme D. "It is a learning tool that allows students to use language for creativity much earlier," he says.

Noblett added a tracking facility that shows the instructor the queries that students make to the bilingual database. "It gives us insight into what students think and how they learn languages," he says.

Most recently, he moved the software to the Microsoft Corp. Windows environment on a high-powered, Intel Corp. 80386-based PC, which allows him to add images and sound. Now Noblett is combining text and the bilingual database with images of the country and culture, as well as the authentic sound of native speakers. "It gives a complete context for listening to the language," he says.

- **Music to your ears.** Fred Hofstetter, who is the associate provost for academic computing and instruction technology at the University of Delaware in Newark, got into computers through music.

"When the videodisc was invented, it was a great way to study music," he says. Students could listen to the music and stop, start and replay sections while following the score on the screen.

Hofstetter didn't stop with just music courseware. Because he is called upon to give so many presentations, he developed Podium, a software product that allows a teacher to create an outline on a word processor and automatically translate it into a hypermedia script in which images, sounds, text and graphics are linked. "In the past, speakers were controlled by the slides. Now, each lecture is a new creation," he says.

For instance, if the student asks a question during a multimedia lecture prepared using Podium, the professor can type a frame number into the system and the desired image appears on the screen, even if the image was not used in the original presentation. A single videodisc stores up to 54,000 broadcast-quality slides.

- **Physics in action.** Edward F. Redish, professor of physics at the University of Maryland, says he worries that "students who come from high school see physics as a collection of unlinked facts. They miss the relationship of the parts and the underlying structure." To truly understand physics, the student "really must be active. Physics is not a spectator sport," Redish insists.

In an effort to involve students in physics, Redish is developing the Comprehensive Unified Physics Learning Environment, which combines material from a number of computer-based physics projects at three colleges — Michigan State, the University of Nebraska and Tufts University in Medford, Mass. — into one hypermedia system. It teaches through computer simulation, microcomputer-based laboratory work, interactive videodisc and

Colleges have seized the initiative in three key areas: networking, interactive multimedia and on-line, full-text, electronic information delivery.

a physics education database.

- **Tell it like it is.** Computer technology is even revolutionizing the traditional lecture hall. At the University of Missouri in Rolla, students sit in the advanced technology classroom at desks equipped with an electronic response panel. The instructor, standing alongside a large projection screen, can present multimedia course materials and get instant feedback from students via the response panel — a new twist to the old surprise quiz.

The instructor at the podium can log onto any computer system on campus and execute any program, which is displayed on a large screen, explains Robert Davis, dean at the University of Missouri's School of Engineering.

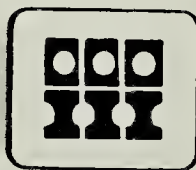
For example, if the engineering department has an application running on the departmental LAN, the instructor can access that application, such as a spreadsheet, and run it for the class. The classroom was a joint project with IBM and has been in operation since October 1989.

- **But can it build a better mousetrap?** Davis, however, has taken academic computing beyond the classroom and applied it directly to the real world. The engineering school built a computer-integrated manufacturing (CIM) laboratory in which students can sit at a workstation, design something and, "if it meets the specification, manufacture it right there automatically, right through to packaging," he says.

The school is now developing a full-scale, industrial-strength version of the CIM lab for commercial manufacturing. Small companies that cannot afford the latest advanced automated manufacturing equipment will be able to buy time-sharing in the school's CIM facility. ◀

Radding is a free-lance writer based in Newton, Mass.

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Tips on how to get
the job you want

An interview survival guide

By Mary Scott

Do your homework. How often have you heard that admonition during your academic career? Yet I assure you, as a former director of systems recruitment at a major corporation and as someone who has interviewed thousands of college graduates, there is no better advice for preparing for — and surviving — an employment interview. For those in the information systems and electrical engineering disciplines, the process can hold special challenges.

How can you prepare yourself to shine during your interviews and invest your job search “homework” time wisely in the process? Here are some strategies to help you prepare:

- **Be honest with yourself.** Long before you embark on your first interview, you need to give serious thought to what type of position, environment and industry best match your skills, abilities, personal preferences and style. Rather than trying to force-fit your background into jobs you see posted in your campus placement office, first decide in which direction you want to go.

All your past work experiences — not just those in an IS environment — will give you important clues. What tasks did you enjoy? What do you want to avoid in a job? Do you work best as a member of a

team or alone? Do you learn better through on-the-job training, or do you expect a formal education program?

Next, think about your courses in college. Are your skills and interests highly technical, or do you prefer using technology to solve business problems? Are you intrigued by emerging technologies, or are the traditional languages and a mainframe environment more to your liking?

Develop an “ideal job” profile — a wish list of characteristics that are important to you in a position. You may not find a job that matches your preferences and expectations in every respect, but the self-awareness you’ll develop will enable you to determine what employment opportunities to pursue.

- **Identify those jobs that match your profile.** The next part of your homework assignment is to identify the types of careers your ideal profile matches and to research the industries and companies that sponsor these jobs. Information abounds in the placement office about the firms that plan to recruit on your campus as well as scores of other companies nationwide. Read company literature and job descriptions, but don’t place too much emphasis on job titles alone when conducting your search. “Systems analyst,”



HAL MAYFORTH

for example, does not mean the same thing at all companies. Focus on the job responsibilities described in company information and compare that information with your ideal job profile.

It may be helpful at this stage to talk with professors and any business contacts you have. Most professionals, on campus as well as in industry, are willing to spend time helping college students sort through the variety of available job options.

Company recruiters are spending more time educating faculty about career opportunities at their firms, so professors may be helpful in recommending companies that have the type of job you're seeking.

Attend information sessions and presentations that companies sponsor on campus. Develop a list of companies you'd like to pursue, based on what you've learned about them.

• **Prepare for the interview.** Having done the preparation work, it's time to focus on developing and polishing the skills you'll need to function effectively in the interview itself. Interviews have been called "a conversation with a purpose," and when conducted well, they should

meet the objectives of both interviewer and student.

For example, company representatives seek to determine how well candidates measure up to their selection criteria. Students have an opportunity to gauge how well positions meet their ideal job profiles and ask questions not addressed in company literature.

Bookstores and campus career centers are well stocked with books and videos on interviewing skills, although their quality tends to vary. Be wary of anyone who guarantees you'll get the job you want; there are too many variables in any interview situation to make such a promise. The value in these instructional devices comes when they tell about different types of interviews and questioning strategies. You should learn to recognize questioning strategies so you can respond appropriately when you're in the hot seat.

Take advantage of all these resources and services to master the mechanics of the interview process, but avoid developing a robotic "canned" presentation. Spend time with family and friends responding to the sample questions that are included in

interviewing skills texts, but don't over-rehearse your answers. Most interviewers are not impressed by a candidate who seems determined to recite a self-promotional speech regardless of the questions asked.

• **Recognize the interview and interviewer.** Although this is true of students in every academic discipline, my research shows that information systems and electrical engineering majors are more likely to experience special challenges during the interview process.

Here are the types of interviewers you're likely to encounter:

Personnel types: Many companies send professional recruiters to campus to conduct initial screening interviews, or else they require that you visit with a human resource representative to fill out necessary paperwork if your first interview is held at the company.

Although such recruiters are usually well informed about positions available and company benefits, they often lack any technical background. Your best approach in these initial interviews is to focus on the

Continued on page 50

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Continued from page 48

nontechnical skills the position requires and to help the recruiter see how you match the job overall. Describe any technical projects or work experience in general business terms and do not attempt to dazzle or intimidate recruiters with buzzwords; they won't understand you at best, and they may well resent your showing off.

Technical line managers: An increasing number of companies are sending systems and engineering professionals to campuses to conduct interviews, a development that is generally welcomed by students who know they can ask technical questions and receive knowledgeable answers. It is not unusual, however, to find that line managers have limited knowledge about the hardware and software you've used on campus.

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment — and to convince the managers that you possess the underlying logic skills and aptitude to learn their systems quickly.

Untrained interviewers: Although this may sound absurd, don't assume that the person conducting your interview has

Your challenge is to describe your technical skills in such a way that interviewers can see similarities to their company environment.

been trained to do so or is even comfortable sitting across the desk from you. A disturbing number of companies — from major corporations to small high-tech firms — send staff to campus who have no idea what questions to ask or how to evaluate candidates. If you sense that this is the case, take the opportunity to summarize for the interviewer what your educational and work experiences have been and describe how you qualify for the position being offered.

I often ask recent graduates what they know now that they wish they had known

when they started their job search. The recurring theme I hear in research I conduct with college students and recent graduates is this: "The work load involved in finding a job is like carrying another course!"

Why bother investing the time to prepare? Although it's generally true that the demand for information systems and electrical engineering graduates is greater than the supply of candidates, that may not be the case for the specific jobs you choose to pursue. Doing your homework — determining what type of position you want, investigating appropriate companies and developing your interviewing skills — will give you an edge over your competition.

More importantly, it will give you the confidence to know you're well matched to the job and will provide you with the knowledge and skills not only to survive but to shine in your interview. ◀

Scott is president of M. E. Scott & Co., a college recruitment consulting and training firm based in West Hartford, Conn. She is former director of staffing at Aetna Life & Casualty.

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**As IS execs compare pay stubs, jobs in the Big Apple
and positions in securities get the big bucks**

By David A. Ludlum

If you're a top information systems executive working in wholesale or retail trade in Arizona, congratulations. Your income is growing fast compared with the salaries of your colleagues in other industries. Factor in your low cost of living, and the numbers look even better.

When it comes to compensation, some IS professionals are gaining ground at a faster clip than others, according to *Computerworld's* fourth annual salary survey.

The variations do not just reflect industry conditions and geography. Compensation is rising faster for some positions than for others across the board. This year, pay for IS managers or supervisors reporting to the top IS executive is up 14% from the level reported last year. Meanwhile, compensation for communications specialists and database analysts has risen only 3%.

The more than 1,500 IS organizations responding to the survey report an average departmentwide salary increase of 5.7% for this year. That compares with nationwide increases of 5.7% for all executives and 5.4% for all salaried employees, according to William M. Mercer, Inc., a compensation consulting firm in Deerfield, Ill. Meanwhile, the U.S. government's consumer price index has risen 5.8% through July of this year.

Senior systems analysts, senior programmer/analysts and

senior operating systems programmers also registered big gains since last year's survey, with compensation up about 10%. Laggards include database managers and administrators; they gained only 4%.

During the four years *Computerworld* has conducted its survey, top IS executives' salaries have jumped the most, rising 15.5%. Senior systems analysts and senior programmer/analysts have done well over the four years, too, along with systems and programming managers. Data center shift supervisors, communications managers and senior programmers have chalked up the smallest overall gains.

With the great value IS organizations now place on business knowledge and interpersonal skills, "pure" programmers tend to get salary increases that just keep up with the cost of living, says Richard Wonder, national director of the IS division at recruiting firm Robert Half International, Inc. Meanwhile, systems analysts — and programmers with the analytical skills expected of systems analysts — make more money.

"As time goes on, there'll be less need for pure back-room coders, because the trend in IS is toward end-user computing, decentralization and people who have business and technical skills," Wonder says.

The average salary for information center managers rose slightly this year, but it remains nearly \$1,600 below its 1987 level. Recruiters attribute

AVERAGE SALARIES AND BONUSES

	Average annual salary	Average additional compensation	Average total compensation	Average years of IS experience
IS MANAGEMENT				
CIO/VP/Director of IS	\$68,690	\$8,581	\$75,611	16.0
IS manager/Supervisor	\$55,236	\$4,734	\$58,843	13.0
END-USER SUPPORT				
Manager, end-user computing	\$47,601	\$2,608	\$49,463	10.1
Information center manager	\$45,179	\$2,650	\$47,100	10.2
LAN manager	\$39,970	\$1,999	\$41,177	6.6
PC specialist	\$32,321	\$1,451	\$33,306	5.1
COMMUNICATIONS				
Network manager	\$48,658	\$2,702	\$50,493	10.0
Telecommunications manager	\$48,611	\$2,749	\$50,578	10.6
Communications specialist	\$37,271	\$1,445	\$38,231	7.7
SYSTEMS AND PROGRAMMING				
Systems and programming manager	\$53,549	\$3,630	\$56,159	12.9
Project manager	\$49,345	\$2,246	\$50,852	10.8
Senior systems analyst	\$44,569	\$1,788	\$45,669	10.4
Systems analyst	\$38,525	\$1,782	\$39,617	7.4
Senior programmer/Analyst	\$39,656	\$1,696	\$40,754	8.9
Programmer/Analyst	\$33,819	\$1,306	\$34,659	5.5
Senior programmer	\$33,911	\$1,105	\$34,631	6.5
Programmer	\$27,581	\$1,125	\$28,312	3.2
TECHNICAL SERVICES				
Technical services manager	\$53,544	\$3,174	\$55,799	13.0
Senior operating systems programmer	\$47,059	\$1,323	\$47,886	11.2
Operating systems programmer	\$39,355	\$1,301	\$40,196	7.3
Data center or operations manager	\$41,527	\$2,005	\$42,878	12.1
Data center shift supervisor	\$30,184	\$1,197	\$30,926	8.5
DATA CENTER				
Database manager/Administrator	\$49,384	\$2,193	\$50,938	10.5
Database analyst	\$41,594	\$1,489	\$42,561	8.0

the declines to a downgrading of the position; as information center managers moved on, they were succeeded by less experienced people.

This year's survey finds top IS executives earning a total compensation of \$75,600 — a fraction of what IS chiefs at the biggest firms in the most competitive job markets make. However, it is a significant outlay for the survey's cross-section of small to large firms across the U.S. "In a lot of communities, someone making \$70,000 is one of the wealthiest people," says Skip Tolette, an executive recruiter at Schmitt Bishop Tolette.

The organizations responding to the survey report average revenues or assets of \$864 million. However, for three-fourths of the companies, that total is less than \$500 million. At the largest companies, the compensation for top IS executives is 38% greater than the overall average.

The really big bucks in IS go to a smaller group of highly visible executives. Jay Gaines, a New York executive recruiter, likens the arrangement to Hollywood's star system. "There's an awful lot of dollars chasing a handful of people," he says. "I think you have 50 top guys in the country who are on everybody's hit list." Only about 20 of them command pay of \$750,000 or more, Gaines says. Individuals at Wall Street's major investment banking firms lead the list.

BIG APPLE, BIG BUCKS

This year's survey again finds top IS executives in New York making more money than their colleagues in other locations. New Yorkers hold a 25% lead over their

Systems analysts — and programmers with the analytical and interpersonal skills expected of systems analysts — make more money.

counterparts in Boston, home to top IS executives with the second biggest paychecks.

The jobs in New York pay a healthy premium even after compensating for the high cost of living there. One reason: There's a lot of competition for the best IS talent in New York. Another reason is that people demand a premium for working there. "It's a tougher place to get people to move to," Tolette says.

The regional ranking of pay for top IS executives does change when adjusted for variations in the cost of living. The Phoenix/Tucson area moves up the most after the adjustment — from seventh place to fourth. There's a strong demand for computer professionals in Arizona because the region has attracted a lot of software companies in recent years, says Dick Minogue, director of U.S. cost-of-living services at Associates for International Research, Inc., a compensation consulting firm in Cambridge, Mass.

The regional variations in pay for top IS executives apply to smaller companies

more than big corporations, recruiters say. Bigger corporations in the outlying regions compete with companies in large cities for top IS executives, so they have to pay as much as those companies do.

Since last year's survey, top IS executives in wholesale and retail trade have bettered their lot compared with their colleagues in other industries. In 1989, the pay for CIOs and vice-presidents of IS was lower in that industry than in all other fields except education and government. This year's survey puts top IS executives in wholesale and retail trade in fourth place — ahead of their counterparts in insurance, manufacturing and health care.

Firms in wholesale and retail trade have been turning to information technology to handle crucial functions such as automating inventory control, says Bob Lemke, a consultant at the William M. Mercer office in Chicago. "They're having to buy talent to catch up to the changes other industries have already made," he says.

Meanwhile, compensation in industries that have traditionally paid the most for IS talent are steady or dropping when bonuses are taken into account, recruiters say.

The big spender image of financial services also looks less certain when one looks at stock options, Gaines says. The options tend to be less valuable at service companies than in manufacturing concerns, where they can be worth \$100,000 or more for top-paying IS positions.

Programmers and analysts do not typically get stock options, but there is growing interest in paying them overtime for extra work, Lemke says. "I think the trend is to pay more straight-time overtime rather than comp time," he says.

Experience in hot technical areas can also add to pay for programmers and analysts. According to Steve Joffe, a vice-president at recruiting firm Source Services Corp. in Paramus, N.J., the hot areas in applications development today include mainframe, on-line database systems, especially using IBM's DB2; midrange systems using IBM's RPG III language or Digital Equipment Corp.'s VAX/VMS operating system; and personal computer systems incorporating relational databases and local-area networks, as well as Unix, C or Windows.

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Ludlum is a former *Computerworld* senior writer.

Some walls are higher than others

Lack of understanding, recognition sometimes mars overall contentment in IS

By David A. Ludlum

The Berlin Wall has fallen, and countries in Europe are opening their borders to one another. But here in the U.S., information systems people still suffer from a feeling of isolation.

Overall, IS people are more than happy with their calling, according to *Computerworld's* fourth annual job satisfaction survey. However, when there is discontent, IS vice-presidents and programmers say, it is often because top managers and computer users do not understand the complexities of IS work or appreciate its importance.

A little more than half the people responding to the survey say they're satisfied or very satisfied with their current positions. Another quarter say they're somewhat satisfied with them.

Overall, the respondents agree that IS is an exciting profession, albeit a high-pressure one. Ask them what they like

most about being in IS, and they're likely to say challenge, followed by technology and variety (see chart at right).

One big challenge is watching costs. IS people need to squeeze more out of old systems and make sure that new technologies are cost-effective, says Hannah Foster, senior vice-president of IS at The Coast Distribution, a distributor of parts for boats and recreational vehicles in San Jose, Calif.

Although costs of certain technologies are falling, the expense of specialized IS training is growing, she says.

Technology has moved up on the list of things the respondents like about their profession: It is the No. 2 choice in this year's survey, up from No. 4 last year.

During the last few years, there has been a lull in exciting new technologies, according to Michael Sepe, IS manager at Irvine Ranch Water District in Irvine, Calif. Today, technologies such as imaging and opti-

cal storage promise to create new ways of doing business, he says.

What the respondents liked least about their profession is related to problems with man-

agement and end users: poor communication, a lack of understanding and recognition of IS work and users' demands, complaints and mistakes.

The messages that the

Two-edged sword

Change turns up as both a blessing and a curse when IS people list the things they like most and least about their work



What do you like the most?

1. Challenge

"We want to maximize and optimize the use of existing systems, not just change because there's something newer or better."

HANNAH FOSTER
SENIOR VICE-PRESIDENT FOR IS
THE COAST DISTRIBUTION

2. Technology

3. Variety

4. Constant change

5. Problem-solving



What do you like the least?

1. Communication

(Lack of communication with or recognition by management)

"Top managers don't communicate effectively what they want technology to do for them. If you allow them to be vague, that's all they are going to do."

LARRY DAVIS
MIS OPERATING OFFICER
SERVICE STAR CORP.

2. End-user mistakes and demands

3. Stress/Pressure/Burnout

4. Long or odd hours

5. Ever-changing business and technology Unrealistic deadlines (tie)

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4. Success of the company	2.94*
5. Opportunity for advancement	3.23*



*On a scale of 1 to 4: 1 is very dissatisfied and 4 is very satisfied.

respondents would most like to pass on to top management are to improve communications, interaction and teamwork and to give IS people more recognition and involvement in decision-making.

"Improve communication" is the message from Larry Davis, MIS operating officer at Service Star Corp., a hardware, lumber and building materials wholesaler in Butler, Pa. His organization has created a customer information system that he says has far-reaching implications, but management needs to convince employees to change their ways and use it. "Its usage is optional until we get effective communication from top management that it shouldn't be optional," Davis says.

Managers continue to be frustrated by senior executives who don't understand technology. Gerard E. Tarpey, associate director of management and computer in-

formation systems at Pace University in New York, says he wishes that top managers knew enough about technology to understand when it's time to upgrade equipment. "It's like pulling teeth to get the OK for added horsepower," he says.

That lack of understanding can trickle down in an organization. IS professionals complain that some computer users don't understand how difficult it can be to create information systems. "It's not just a matter of flipping a switch and getting a report out," says James Evans, a senior programmer and analyst at Systematics, Inc., a facilities management company based in Little Rock, Ark.

Foster is troubled by a more general lack of understanding of IS, particularly the perception that IS organizations are somehow different and that IS people are "techno-nerds." IS people usually possess

a clear understanding of business needs, she says.

Users and top managers also fail to appreciate the significance of IS work, survey respondents say. In developing systems, IS people create a "hidden infrastructure" and change the way business is conducted throughout an enterprise, says Mike Whaley, MIS/DP manager at Job Opportunities, a nonprofit job training agency in Reno, Nev.

"There are a lot of things you tailor, and therefore, you subtly change the way decisions are made," Whaley says. Training people to use computers also makes an impact on the enterprise that most people don't appreciate, he says.

STRUCTURALLY FRUSTRATED

These misperceptions, misunderstandings and tensions can leave IS people frustrated. When asked about their biggest frustration, slightly more than half of the respondents point to office politics. As IS organizations gain clout within their enterprise, people in other areas can view the changes as empire building, Sepe says.

The IS organization at Irvine Ranch Water District is taking charge of telemetry systems used for remote control of water supplies — an area that had been the bailiwick of an engineering group. That change has created turf battles. "Engineering people say, 'You guys print paychecks. What do you know about telemetry?'" Sepe says.

Evans is also frustrated by politics. He recalls a client of his company ousting an IS consulting firm — wrongly, he says — after the consulting firm had cut back on the role of some IS executives. Those executives had the political clout to fight back.

One way of gaining political clout is to move into the executive suite. But three-fourths of the respondents to the survey say their company's IS department does not provide the right opportunities to advance to non-IS management positions.

An alternative to the move to a non-IS management position is to change jobs. Almost one-third of the respondents say they are always looking for job opportunities. One-fifth of middle managers also have an eye out for opportunities, compared with 16% of senior executives and 31% of IS professionals. ◀

Ludlum is a former *Computerworld* senior writer.

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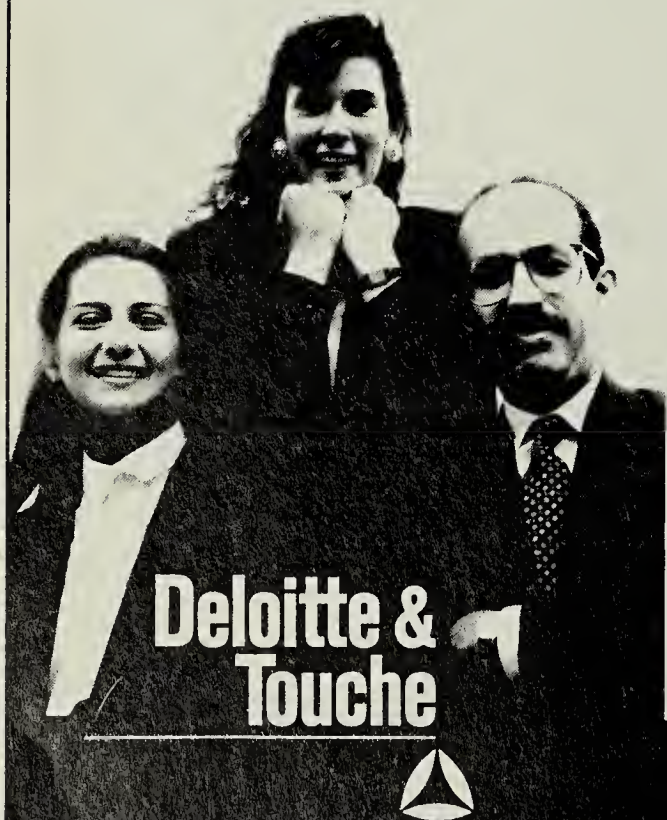
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Graphic: Magnetic fields surrounding components in a Motorola transceiver are captured using advanced imaging technology.



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INTERGRAPH

Top IS Users Soar Above Tough Times

By Michael L. Sullivan-Trainor and Joseph Maglitta

Gone are the days when information systems could hide in the back office, sheltered from the turbulent winds of corporate change. As technology plays a greater role in determining company success, information systems professionals are facing the same challenges as their peers in other front-line departments.

Nothing illustrates this shift more clearly than *Computerworld's* 1990 *Premier 100* rankings. Each of the qualifying companies exemplifies the new role of IS.

Now, rather than focusing only on the latest IBM announcement, *Premier 100* executives are grappling with the various challenges of their industries. Financial services firms such as Paine Webber, Inc. are struggling with Wall Street's woes. Defense contractors such as General Dynamics Corp. are anticipating large reductions in their government business. Retailers such as Sears, Roebuck and Co. are battling reduced consumer spending. All the companies on the list are battenning down the hatches for the looming recession.

However, the biggest factor that causes these companies to rise above various business booby traps is their continued commitment to IS — despite corporate performance dips and anxiety about the future. Not coincidentally, faith in IS corresponds closely to a company's ability to remain profitable despite tough times.

For example, MCI Communications Corp. — the only company to rank in the *Premier 100* Top 10 three years in a row — repeats its first-place ranking in 1990 with a 61% increase in profitability from 1988 to 1989 and a 40% increase in its IS budget (from \$285 million to \$400 million). These achievements are the products of continued victories in the organization's competi-

tive battles with its long-distance service rivals as well as expansion and strategic alliances.

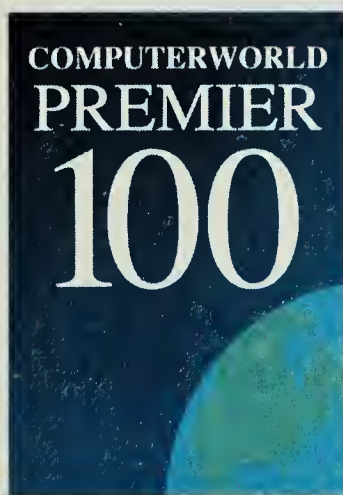
FMC Corp. rockets to second place this year with a \$110 million IS budget (an increase of 10%) and significant investments in new equipment. For example, IS spending in the company's agricultural chemicals group has increased 200% in the past three years. During that time, three plants were upgraded on the industrial chemicals side of the business, along with investments in computer systems for sales and marketing. At

the same time, the company's profitability increased 21% from 1988 to 1989. All these events occurred at a time of aggressive competition in the chemicals industry and threatened defense cutbacks, which could affect half the company's business.

American Airlines and its parent, AMR Corp., continue to wing along atop the transportation industry. The company reduced its billion-dollar IS spending by less than 1% while maintaining its commitment to Sabre and planning a major downscaling of the massive computer reservations system. Profit for AMR was also down 5%, contributing to its slippage in rank to fourth overall.

Other companies continue to be committed to technology despite profit problems — a tribute to the IS executive's ability to support the technology program in difficult weather. Sears vaulted to 12th place in 1990 on the strength of a 20% budget increase and profit growth of 3.8%. Yet the \$54 billion giant is struggling in 1990, and cost-reduction pressure is mounting. Nevertheless, a strong management commitment to technology continues and may help pull the company back into the limelight.

Bankers Trust New York Corp. is riding a roller-



coaster earnings cycle. The volatility of South American loans made it No. 1 in profit growth in 1988 and dealt the company a loss in 1989. However, the bank's commitment to IS remains unswerving.

Overall, the *Premier 100* Top 10 increased spending by an average of 8%, or 5.4% of their total revenue, down 0.2% from last year's Top 10. Investments in current computer systems increased by an average of 6%, but the ratio to revenue actually decreased by 0.2%. Investments in personnel also decreased by an average of 5%, and training expenditures remained

about even. The growth area is personal computers and terminals, which increased by an average of 12%.

As significant as the statistics are, the way these investments are applied makes the difference between *Premier 100* winners and the rest. One key ingredient to a recipe for IS effectiveness is the ability to carry out a unified vision of where technology integrates with business requirements.

For example, MCI is successful because its IS investments are intrinsic to the development and growth of its network, which is the single most important element

in the company's arsenal.

As important as insight into systems applications are the tools to carry out the functions. All of the top companies employ current technology to get the job done, but some stand out more than others.

Merck and Co.'s Albert Cinorre, vice-president of computer resources, oversees an IS budget of \$185 million. Traditionally a Wang Laboratories, Inc. shop, Merck has turned to the latest IBM systems to speed drug development, particularly in the area of molecular modeling.

Such investments in the latest systems

THE 100 MOST EFFECTIVE USERS OF INFORMATION SYSTEMS

1	MCI Communications Corp.	35	Caterpillar, Inc.	69	Rockwell International Corp.
2	FMC Corp.	36	Salomon, Inc.	70	Freeport-McMoran, Inc.
3	Bankers Trust New York Corp.	37	Monsanto Co.	71	The Travelers Corp.
4	AMR Corp.	38	Merck & Co.	72	McGraw-Hill, Inc.
5	Union Texas Petroleum Holdings, Inc.	39	Contel Corp.	73	Amax, Inc.
6	General Dynamics Corp.	40	Bankamerica Corp.	74	AT&T
7	Paine Webber, Inc.	41	Grumman Corp.	75	The Penn Central Corp.
8	Norwest Corp.	42	Polaroid Corp.	76	J. P. Morgan & Co.
9	Banc One Corp.	43	The Timken Co.	77	Lockheed Corp.
10	Gencorp, Inc.	44	General Re Corp.	78	Sun Co.
11	The Dun & Bradstreet Corp.	45	Northeast Utilities	79	Abbott Laboratories
12	Sears, Roebuck and Co.	46	The B. F. Goodrich Co.	80	Ambase Corp.
13	Gillette Co.	47	Centerior Energy Corp.	81	National City Corp.
14	Chicago & North Western Transportation Co.	48	The Mead Corp.	82	Duke Power Co.
15	Signet Banking Corp.	49	The Boeing Co.	83	Becton, Dickinson & Co.
16	Martin Marietta Corp.	50	Baxter International, Inc.	84	Mutual Benefit Life Insurance Co.
17	Security Pacific Corp.	51	Northrop Corp.	85	Xerox Corp.
18	United Telecommunications, Inc.	52	Rohm & Haas Co.	86	Louisiana Land & Exploration Co.
19	Corestates Financial Corp.	53	Massachusetts Mutual Life Insurance Co.	87	Carter Hawley Hale Stores, Inc.
20	The Dow Chemical Corp.	54	New York Life Insurance Co.	88	Colgate-Palmolive Co.
21	GTE Corp.	55	CSX Corp.	89	Aluminum Co. of America
22	Bell Atlantic Corp.	56	Wells Fargo & Co.	90	Valhi, Inc.
23	Ameritech Applied Technologies	57	The Prudential Insurance Co. of America	91	Inland Steel Industries, Inc.
24	Allied-Signal, Inc.	58	Primerica Corp.	92	Eli Lilly & Co.
25	Air Products and Chemicals, Inc.	59	United Technologies Corp.	93	Merrill Lynch & Co.
26	American Express Co.	60	The Pittston Co.	94	The Mutual Life Insurance Co. of New York
27	US West	61	Ingersoll-Rand Co.	95	J. C. Penney Co.
28	Federal Express Corp.	62	Union Carbide Corp.	96	Enron Corp.
29	Southwestern Bell Corp.	63	Metropolitan Life Insurance Co.	97	Shawmut National Corp.
30	3M Co.	64	TRW, Inc.	98	Northwestern Mutual Life Insurance Co.
31	Atlantic Richfield Co.	65	McDonnell Douglas Corp.	99	The Aetna Life & Casualty Co.
32	Oryx Energy Co.	66	Textron, Inc.	100	Jostens, Inc.
33	Phillips Petroleum Co.	67	Quantum Chemical Corp.		
34	Pacific Mutual Life Insurance Co.	68	Mobil Corp.		

must be tempered today with a keen awareness of budget constraints. Cost efficiency is a major theme among the most effective users of IS. At FMC, for example, systems are purchased at the beginning of their cycle below peak costs and are jettisoned before their value expires. But more than that, a system will not cross the threshold of the organization's computer center without a proven business requirement.

Other firms emphasize process and integration with the company culture as subtler ways to fashion effective IS groups. General Dynamics focuses on total quality management, where less than 100% quality is unacceptable. Such concentration speeds application development by involving more user participation and embeds the philosophy of doing it right the first time into the organization's culture.

Last but still key is an emphasis on the people who run the IS operations. Companies such as Paine Webber and Union Texas Petroleum Holdings, Inc. empower those involved in IS — both users and technical specialists — by giving them control over their work and exposure to both technical and business requirements. In fact, Paine Webber recently fired 71 outside consultants and entrusted their projects to internal staff to cut costs and show faith in the staff at the same time.

The *Premier 100* also tells the story of companies that, despite strong efforts, find it difficult to keep up with the highfliers in the choppy IS stratosphere. Among these are Baxter International, Inc., which fell from the lofty position of eighth overall and No. 1 in manufacturing last year to 50th this year because of significant downsizing and restructuring, leading to a \$50 million reduction in the IS budget. Michael Heschel, Baxter's IS chief, moved over to head IS at Security Pacific Corp.

Modest increases in spending and profit at Dow Chemical Co., another industry winner last year, caused it to be passed by other fast-rising companies. The company relocated five spots lower on the list, with continued data center consolidations as the major activity.

Lockheed Corp. toppled down on the list because of a large reduction in profit accompanied by changes caused by a restructuring of the aeronautical group, shutting down operations in California and consolidating in Georgia.

Other companies, such as Northeast Utilities, which captured the top rank overall in 1988, simply failed to keep up

Opting for a lean, mean IS machine



eaner, more supple and closer to the action is how firms want their IS organizations, IS executives say.

Rather than centralizing or decentralizing, executives report that their organizations are crafting new, hybrid structures combining both forms. In fact, a survey of 92 companies reveals that more than half (56) are now operating "mixed" IS organizations. Another 24 retain centralized structures, while 12 are fully decentralized.

Proponents of mixed structures include: FMC Corp., General Dynamics Corp., Abbott Laboratories, Aluminum Co. of America and Pacific Mutual Life Insurance Co. Centralization is favored by Paine Webber, Inc., The Travelers Corp. and Signet Banking Corp. Among the larger decentralized companies are American Express Co., Gencorp, Inc. and United Technologies Corp.

According to IS managers, the new hybrid structures let organizations take advantage of local access to technology while still providing overall guidance for systems efforts from the central organization.

An important related development is the fast-growing popularity of data center consolidation as a cost-cutting measure. All told, 43 of the companies report that they have merged or consolidated data centers during the last year. Another 27 expect to do so in the coming year.

Typical among consolidators is Edwin Sherin, senior vice-president of IS at Primerica Corp., who reports: "We will continue to implement a data center consolidation effort, which will yield significant expense savings."


Ameritech reports data center consolidations from 14 to four during a five-year period.

Consolidation is popular among aerospace firms, which are also restructuring and downsizing in anticipation of federal defense budget cutbacks.

MICHAEL L. SULLIVAN-TRAINOR AND JOSEPH MAGLITTA

with the pack. Modest budget and value increases of less than 2% and personal computer and terminal boosts of less than 10% coupled with a 10% profit drop caused the company to fall further down the list.

All the ups and downs of life at the top of IS evidenced by the *Computerworld Premier*

100 show the battle scars of the 1990s. And to think it's only the beginning of the decade. 

Sullivan-Trainor and Maglitta are *Computerworld* senior editors.

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Fashioning systems for the future

**Levi Strauss' Rund designs readiness for change
into world's largest apparel firm's IS**

By Jean S. Bozman

The art of managing information systems starts with the task of designing them well. That is the thesis of Donna Rund, vice-president of information engineering at Levi Strauss & Co., who believes that thinking about computer-aided software engineering (CASE) is just as important as having programmers crank out lines of code.

To illustrate her point, Rund draws pictures of her business model of San Francisco-based Levi Strauss. It is a functional representation of intersecting circles, matching all the business units to the systems that support them. It is really a blueprint of the underpinnings of the world's largest apparel company. With annual revenue of \$3.6 billion, Levi Strauss operates on four continents and distributes its products around the world.

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself," she says, sitting in her brick-walled office overlooking San Francisco Bay. "Our challenge in the '90s is to focus on *what* you do in DP, not on how you do it."

PEOPLE SKILLS

The very nature of IS is changing, and the people who work at information engineering, as Rund calls it, must change their job descriptions. "We're moving our people to be designers and systems integrators," she says. "There's still a need for technicians. But we're going to have a merging of skill sets between IS and the end user. People skills — like the ability to negotiate, facilitate and elaborate — will make our people into knowledge workers."

Those workers have to be able to extract systems requirements from business unit managers who have never programmed a personal computer. They have to be able to listen — and to travel, if necessary — to where the business units are located.

They also have to build systems in a modular fashion so that, in Rund's words, "applications development products can be popped in and out without affecting the overall systems design." They can no longer afford to be cloistered technicians, toiling away in isolation, she adds.

For example, Rund envisions that applications written for an IBM 3090 mainframe at headquarters will one day be transferable to IBM Application System/400s at Levi Strauss factory sites



CINDY CHARLES

RUND WANTS Levi Strauss' staff to gain business skills, develop flexible systems

around the world. Levi Strauss is currently using Knowledgeware, Inc.'s Information Engineering Workbench as the basis for its CASE design.

"Beyond that, the challenge will be to manage applications as the business changes," Rund says. One way to do that, she says, will be to issue new application "releases" in much the same way that software vendors do.

ADAPTABLE ATTITUDE

Her statements are in sync with the evolving management philosophy at Levi Strauss, which has recently undergone a leveraged buyout and drastic downsizing in an effort to stay competitive.

The watchword at the firm is flexibility, as IS planners employ electronic data interchange, IBM mainframes and relational databases to keep pace with other clothing manufacturers in Europe and the Far East.

"We are shifting the corporate asset from being the application code to being the design [of that application], which has lasting value," says Bill Eaton, chief information officer at Levi Strauss. "The

"If you don't have a clear picture of where you're taking your company, you tend to react to each new piece of technology for the sake of the technology itself."

Donna Rund
Vice-President of IS
Levi Strauss & Co.

specific products you use to write that code are not as important."

Rund, Eaton says, practices enterprise modeling. "In the information engineering area, Donna is providing the vision of the kind of systems we want to build: flexible, durable and responsive to changes in the technology environment," he says. "She is the glue that holds all of that together."

Today, Levi Strauss' worldwide IS staff numbers just 400, with about 325 in San Francisco and the rest supporting business units in Tokyo, Toronto and Brussels. "We've cut out many management layers so that it's really a very, very flat organization," says Bob Mann, director of applied information technology. Mann manages Levi Strauss' CASE strategy and works closely with Rund on data design issues.

GO TEAM!

To make that flattened organization work, Rund and the other 13 IS managers reporting to Eaton have to work on motivating their staff to act as a team. "Donna has a lot of energy," Mann says. "She's able to get a lot of buy-in across [information resources] rather than vertically. Flattening the organization only works if people feel empowered, if they feel they are creating part of the destiny of Levi Strauss." That feeling is enhanced by an employee stock ownership plan that was established after the buyout in the mid-1980s.

Rund, who was named to her current

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position 2½ years ago, has been at Levi Strauss since 1980. Previously, she worked at several large banks and insurance companies as a software manager. In her off hours, she trains and shows horses. "It's like teaching a horse ballet, when you do it right," she says.

Rund wants IS workers to get out of the office occasionally so they can step back from their programming and concentrate on the larger issues of information architecture. "We've had two-day off-sites in which we discussed the role of a manager and what it will be like in the future," she says. "Systems analysts will be working in the user environment. And with the new technology that's coming along, you won't have to be a programmer to design a system."

HIGH ASPIRATIONS

Rund's IS leadership sessions complement those of the rest of the company, which has a 2-year-old "Aspirations" program handcrafted by top management. The Aspirations mission statement, endorsed by Chief Executive Officer Robert Haas, lists six key management touch-

The very nature of IS is changing, and the people who work at information engineering must change their job descriptions.

stones: new behaviors, diversity, recognition, ethical management practices, communication and empowerment.

The atmosphere at the Levi Strauss Plaza headquarters, along San Francisco's Embarcadero waterfront area, is relaxed. There is modern art on the walls, and attire is casual — often Levi Strauss jeans or jackets, in fact. Programmers work on IBM DB2 applications during the day and sit by the plaza fountain or sip a cup of capuccino at a nearby cafe at lunch.

The same messages are brought home at periodic off-site leadership weeks led by top Levi Strauss managers. In

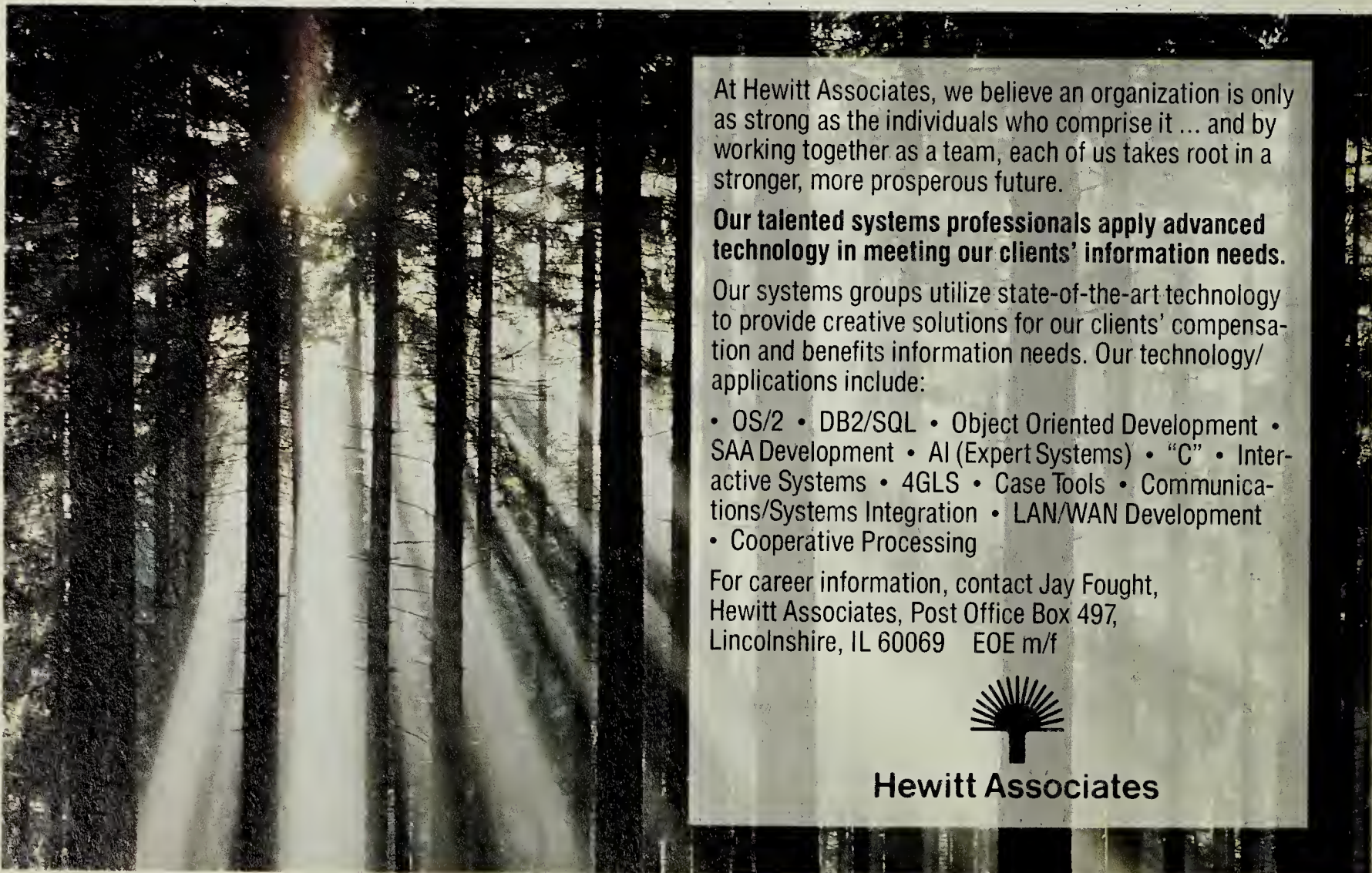
June, Rund took her turn leading a week-long off-site session in Santa Cruz, Calif. "Our off-sites are moving us ahead," says Hank Ahlgrim, manager of database administration.

"Our management has made it very clear to us that if you're not activating creativity and empowerment, if you're not pushing authority and responsibility to those nearest the action, you won't survive in the 1990s," he adds.

In the end, Rund says, it is the people of Levi Strauss' IS group that will enable the overall business plan — or slow it down. "It doesn't matter which hardware we're on or which telecommunications gear we have as long as that gear doesn't get in the way of moving the company forward," she says. "You have to have a vision of where you want to go and start working your way toward that vision. What we've been doing is learning how to adjust our internal business processes to a brand-new world."

Bozman is *Computerworld's* senior West Coast editor.

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Experiencing life at the top

Merrill Lynch's Peterson earned his way into top management's inner sanctum

By Amy Cortese

Tracking Merrill Lynch & Co.'s minute-to-minute stock performance on a personal computer in his corner office overlooking Manhattan's financial district, DuWayne Peterson does not look like your average information systems chief. Indeed, he is not.

Known as the million-dollar man because of his seven-figure salary [CW, Jan. 15], Peterson has accomplished what many IS executives are still striving for — entry into top management's inner circle.

"You couldn't be in a better position" in this industry, acknowledges the 58-year-old Peterson. But he stresses that his job goes beyond that of the typical IS chief.

As executive vice-president of operations/systems and telecommunications at the nation's largest retail brokerage house, Peterson oversees 12,000 employees and a budget of just over \$1 billion.

As testament to his important role at Merrill Lynch, he is an *ex officio* member of the executive committee, along with the chairman, president and a handful of other executive vice-presidents.

Peterson seems to have the right balance of technical and business savvy, colleagues say.

"DuWayne is very much a senior business executive at the top of the organization. With a firm like Merrill Lynch, that's what you need," says Bruce Turkstra, Merrill Lynch's senior vice-president of global IS.

"He has good political sense and social sense," adds Gerry Eli, director of



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THE MILLION-DOLLAR MAN seeks to control costs and deploy cutting-edge technology

global IS. "He fits right in with upper management."

Peterson cites three success factors for aspiring IS executives: a solid track record of performance, good communication skills and the ability to translate technology into business terms. "The key is establishing credibility with management," he says. "The compliment I always get is that I make it sound so easy. You have to take the mystery out of it."

An only child born in Evanston, Ill.,

Peterson spent most of his youth in the Detroit area. His career has taken him from Detroit to California to New York, where he and his wife now reside in an Upper East Side co-op. An avid skier, tennis player and golfer, Peterson manages to return to his Los Angeles-area home a few times a year to pursue those interests.

After graduating from MIT and serving a brief stint as a civil engineer corps officer in the U.S. Navy, Peterson joined Honeywell, Inc.'s temperature

control business in Detroit, as his father had done. When Honeywell started getting involved with computers in the 1960s, Peterson was intrigued and returned to school with plans to get into the dawning industry.

Armed with an MBA from the University of California at Berkeley, Peterson went back to Detroit to work in IS at Ford Motor Co., modernizing the company's operations and product development systems.

Since then, Peterson has served distinguished terms at Citicorp, RCA Corp. and, most recently, Security Pacific Corp., where he was executive vice-president of the bank's Automated Data Processing Group for several years.

Peterson came to Merrill Lynch in 1986. "There's been a lot of change since he's been here," Eli says, noting that the IS budget and staff have declined, and the group is more control-conscious.

As Wall Street continues to undergo brokerage industry contractions, Merrill Lynch has been one of the hardest-hit firms because of its freewheeling expansion during the boom years of the 1980s.

"DuWayne has a unique ability to let his people show initiative while establishing a vision."

**Bruce Turkstra
Merrill Lynch**

Peterson's charter has been to control costs while deploying technology to Merrill Lynch's strategic advantage.

In light of layoffs and budget cuts, some might resent Peterson's large salary, but colleagues defend it. "He deserves every penny of it. He's added 10 to 100 times more than that to the firm," Turkstra says.

Peterson says that his status gets him "a lot of notoriety," but colleagues describe him as first and foremost a family man. No doubt he has helped inspire two of his three children to become involved in the computer business: One is in telecom-

munications at Procter & Gamble Co., and another works in the computer center at Pacific Bell.

Peterson's management philosophy? "I like to hire the best people I can get my hands on, give them the authority and the tools they need to get the job done, then let them have some fun," he says.

Subordinates agree. "DuWayne has a unique ability to let his people show initiative while establishing a vision," Turkstra says.

Eli characterizes Peterson's informal, entrepreneurial style as "more California. He sets goals and expects everyone to live up to expectations."

Where do you go from the top? Peterson says he will finish out his working life at Merrill Lynch.

"I'd like to retire eventually, maybe do some consulting," he says. But when that time comes, he says, "you stop and take stock of your life. This business moves so fast."

Cortese is a former Computerworld Mid-Atlantic correspondent.

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Delivering data to the deal makers

Warner's Winski has the communications tools for life in the entertainment fast lane

By Clinton Wilder

Last year was the year of *Batman*, the Rolling Stones tour and the blockbuster \$13 billion merger of Warner Communications, Inc. with Time, Inc. It showed, more than ever, that the entertainment industry is driven by big hits, big bucks and big deals.

Information systems plays an increasingly important role in the fast-moving world of movie moguls and millionaire rock musicians. But Don Winski, executive director of corporate information services at Warner, knows that strategic systems are sometimes no substitute for power lunches or conference calls on car phones.

"Information is not just what's on a computer screen or on paper," Winski says. "Voice is information and is usually more important in closing a deal than classic hard data. It's hard to predict when a deal will click, but we [in IS] have to be ready."

Winski's personal accessibility is evident in his strong handshake, hearty laugh and the pile of comic books on his office coffee table. His speech flows quickly with a slight tinge of his Brooklyn birthplace, a style that he likes to call "a New York corporate accent."

Originally trained as a chemical engineer, Winski moved into operations research and has had a varied computer technology career with stints as a consultant, entrepreneur and IS executive. He and those who know him agree his business background is essential for success in the entertainment industry's fast lane, particularly in a culture led by deal-mak-

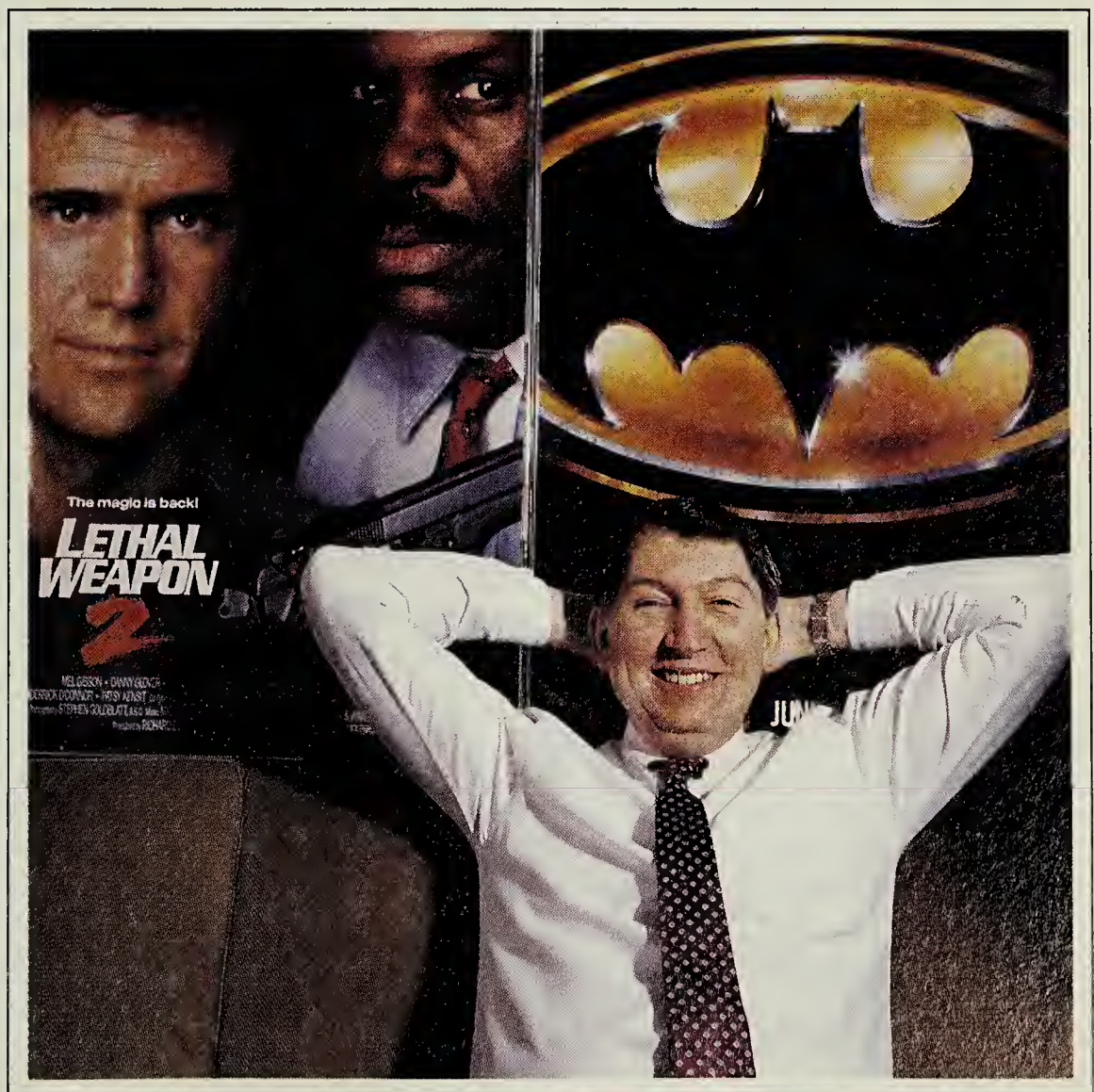
ing Steven Ross, Warner's chairman.

"It's a tough, take-no-prisoners business," says Jerry Mayfield, a principal at the DMW Group, a telecommunications consultancy that has worked closely with Warner. "Most guys would last about 15 microseconds in a job like that unless they can communicate at the business level."

Mayfield describes Winski as "forceful but subtle" in working with Warner's diverse business cultures,

which range from the blue jeans of acquired small record companies to the tailored suits of buyout financiers. "It was like hand-to-hand combat getting some business units onto the corporate network," Mayfield says. "Don was like an orchestra conductor bringing order to it."

At Warner, Winski forcefully advocates centralized network management and equipment purchasing for significant vendor discounts but is equally insistent on decentralized IS decision-



ANDY FREEBERG

WINSKI'S MISSION is to provide leadership for a decentralized organization

making at the business unit level.

"Corporate headquarters does not have a monopoly on intelligence," he says. He defers explaining any IS projects in Warner's business units, saying, "I don't want to steal their thunder."

From his office in New York's Rockefeller Center, Winski says he has the necessary overview of Warner's computer and communications infrastructure to suggest strategic opportunities. "We try to be a catalyst and a facilitator but not take control," he says. "That can be hard for people from a traditional data center mentality."

Winski's mentality is anything but that. Armed with a master's degree and doctoral work in operations research at Brooklyn Polytechnic University, he joined Price Waterhouse as an electronic data processing consultant. His IS career continued at Royal Dutch Shell and Ingersoll-Rand Co., but, he says, "in my heart, I'm always a user."

He later became chief executive officer at a cellular telephone services business owned by Bell Atlantic Corp. He joined Warner in 1986 "by sheer accident" when

a headhunter called.

Although he was new to the entertainment business when he joined Warner, Winski says his IS background with user, vendor and consulting firms has given him the requisite people skills for a company such as Warner.

"I've worked with strategic planners, entrepreneurs and now with deal makers," he says. "They're all highly intelligent, highly sensitive people, and after enough years in the business, you build up a sensitivity in your fingertips in dealing with them. You get away from hard data — it's more personal."

Winski admits that it is fun living in a corporate world in which sharing an elevator ride with Robert Redford is not uncommon. "It makes me more interesting at cocktail parties," he says.

All those movies, records and cable television shows add up to a \$5 billion company with an IS budget of a hefty \$100 million. And Warner will soon swell to \$11 billion when it completes its merger with Time — whose offices are, ironically, connected to Warner's through a subterranean shopping con-

course below midtown Manhattan.

Winski is mum on the details of how the two huge IS operations will be merged but says he would like to see Warner's philosophy of a tight marriage between computers and telecommunications continue. "The information infrastructure is ineffective if you separate the two," he says.

It is at the business unit level that Winski believes the strategic systems must be developed to better serve Warner's stable of producers and performers. Computer systems may not find the next Tracy Chapman, but they can help keep the singer as a Warner artist after the talent scouts discover her. One system, for example, now provides clients with more detailed information about where their royalty payments are derived.

"Our philosophy is that the artist is always right," Winski explains. "The creative artist is the lifeblood of this company."

Wilder is *Computerworld's* senior editor, management.

Tips for success in the '90s

Ask 10 top IS executives what skills will be crucial in the 1990s, and you'll get one answer: the ability to look, think and act like a general business manager. *Computerworld* asked top IS executives to list what they consider to be the most important factors for success in the coming year. Here's what they say:

- 1 Build a competitive organization.** Bill Friel, vice-president of IS at Prudential Insurance Co., says he believes a competitive advantage comes from recruiting the right people, then motivating, training and retaining them.
- 2 Rethink business processes.** IS managers need to rethink business procedures with an eye toward simplification and greater customer satisfaction. Mutual Benefit Life Insurance Co. did just that, reducing the number of individuals who process an application for a policy from 19 to one.
- 3 Focus on customers.** "I want my people to think of the things they can do to improve the services we provide to the real customers," says Michael Zucchini, executive vice-president and chief information officer at Fleet/Norstar Financial Group in Providence, R.I.
- 4 Consider outsourcing.** Tougher competition and profit pressures will force more IS executives to take a hard look at hiring third parties to take over functions and services that traditionally have been done in-house.
- 5 Develop a global perspective.** "If you're involved with international business, you have to understand the

strengths you have in operating a telecommunications network around the world," says Robert Luft, who is currently group vice-president for chemicals and pigments at Du Pont Co. "If you don't have a competitive network," he says, "you have a real problem in your business."

6 Foster teamwork. At Bank of Boston Corp., for example, uniting business managers and IS will be "one of the biggest challenges of the 1990s," says Kevin Moody, the company's director of corporate information and technology. Line managers are in the best position to envision changes in the way information systems are used, and their leadership invests projects with ownership.

7 Master expense justification. More than ever, management will be saying, "'Hey, show me how this is going to make a buck on the bottom line,'" says Timothy Turnpugh, executive vice-president of operations and director of MIS at Seafirst Corp. in Seattle.

8 Avoid information overload. Yes, it is possible to have too much of a good thing. The bottom line? IS managers must learn to be selective consumers of information.

9 Keep abreast of technology. While developing a better grasp of the business is the key, top IS executives also need a broad understanding of technology, says Patricia Wallington, vice-president and CIO of the Information Management Division at Xerox Corp.

10 Stay within your budget. Enough said.

Debunking the two-page resume myth

Saying everything you need to say will tell your prospective bosses everything they need to know

By Mark Duncan

Perhaps it is only the information systems profession, but job applicants, whether junior programmers or senior technicians, have somehow been convinced that a resume must be two pages — no more, no less.

Needless to say, it is utter foolishness to limit a description of your talents, skills and experiences on the basis of an inexplicable convention. The well-worn argument waged in favor of this convention is that managers are busy people and do not have time to read more than two pages of anything.

Nonsense!

Consider the following scenario: Acting as an intermediary, you deliver a four-page resume to your manager for a colleague. What are the chances of your manager scrutinizing the resume promptly? Now what if the president of the company hands your manager a six-page resume and asks him to weigh the strengths and weaknesses of the candidate? Chances are the manager will know that resume inside out by the next day. So, length is a poor criterion. Indeed, one should question the propriety of working for someone whose objectivity is determined by word count.

A resume's essential purpose is to act as a marketing tool, an advertisement used to convince a prospective employer (who is undoubtedly looking at many such advertisements) that you are the right

person for a job. But if your resume looks and reads like the others, why should it get special attention and treatment?

In business, the strategic imperative for organizations is to differentiate themselves from competitors, not only through product or service quality but also through eye-catching packaging and attractive side benefits. The same is true of resumes. A resume is your first — and possibly your most important — opportunity to differentiate yourself from rivals. Broadly speaking, content and appearance represent the two key opportunities for differentiation.

Why shouldn't your resume arrive in a customized envelope with a printed return address instead of a gummed label? Why shouldn't the envelope and paper be color-coordinated? Plain white stationery pales next to the aesthetic blues, grays and beiges available at most stationers.

In terms of format, there must be better and more practical alternatives to the underlined dates and company names, followed by a dry paragraph in incomplete and grammatically incorrect phrases. It may come as a surprise to some, but written English is governed by universal rules, regardless of context, that render inexcusable passages such as this: "Senior analyst on two systems. Project leader on one. Responsible for analysis, design and development. Supervised two programmers. Troubleshooting and maintenance skills."

Although the reader may extract the

information, he undoubtedly could do so more easily if it were written in correct English. If brevity is required, consider using a tabular format in which one column may have dates and position, another hardware and software and a third having company name and experience. Horizontal and vertical lines make the format truly tabular.

As for the appearance of text, the capabilities of word processors and desktop publishing software have opened up myriad possibilities. The fonts and print styles available mean no two resumes need ever look alike. Page layout must be pleasing to the eye and can now be enhanced by different print sizes, underlining and bold-facing to separate information or emphasize items.

Resume content is governed by common-sense criteria. Facts must be presented honestly and unambiguously. The reader must have no difficulty in extracting experiential data to match with job requirements. Keep jargon to a minimum.

Beyond this, a resume must also offer a certain comfort level for its subject. A resume is a very personal item and must therefore be a reflection of oneself in tone, appearance and style.

To be an effective marketing tool and serve its intended purpose, a resume must be perfect. Remember, you are trying to differentiate yourself from others. Even if it turns out that other people possess identical experience, the way that experience is presented may determine who is called for an interview.

Duncan is a quality assurance consultant at a large Dallas bank.



MBA's aren't always vital

**In the end, experience in the real world often
means more than an advanced degree**

By Janet Mason

Although some bill it as the key to the executive suite, a master's degree in business administration holds no guarantee of career advancement for the information systems professional.

In some companies, an MBA can open the door to management or bring a larger starting salary. However, in most hirings and promotions, experience is weighed far more heavily than an MBA, some observers say.

Walter Popper, a principal at Index Group, Inc., a Cambridge, Mass., consulting firm, contends that an MBA is the crucial first step toward management.

Popper notes that techniques for automating software development, such as computer-aided software engineering, call for systems developers to possess a

greater understanding of their company's business. Increasing use of such tools should lead IS organizations to place a growing value on employees with a business education, he says.

John F. Rockart, director of the Center for Information Systems Research at MIT's Sloan School of Management, says an MBA can help IS people move into line management, increasing their earning potential.

At large consulting firms, an MBA can help technical professionals understand applications from the user's perspective, says Charles Emley, partner in charge of information technology consulting at Touche Ross & Co. About half the people Touche Ross hires have just received MBAs, while the rest are hired mainly

for their work experience.

Other observers stress that work experience can outweigh formal education. If the choice is between an IS professional with an MBA and one with solid experience working with users, says Roger Sobkowiak, a partner at Software People Concepts, Inc., a New Haven, Conn., recruiting firm, the one with experience will be chosen for a position.

At Boeing Computer Services in Bellevue, Wash., the IS staff members are encouraged to obtain MBAs

through a tuition reimbursement plan. The broader outlook they acquire with an MBA can help them better understand decisions made in the firm, says Elaine deLappe, the division's manager for human resources support services.

An MBA can be a tiebreaker in decisions on promotions or hirings, says Cameron Carey, president of Computer Security Placement Service, Inc., a recruiting firm in Northboro, Mass.

Can an MBA help boost IS earnings? Sobkowiak says it will not enhance them dramatically, while Emley says it can. Emley says that by completing a "first-class" MBA program, a corporate IS employee with a technical undergraduate degree and three to five years of experience might boost his pay \$5,000 to \$10,000. If he moved to a consulting firm, his pay might increase by \$10,000 to \$15,000. ◀



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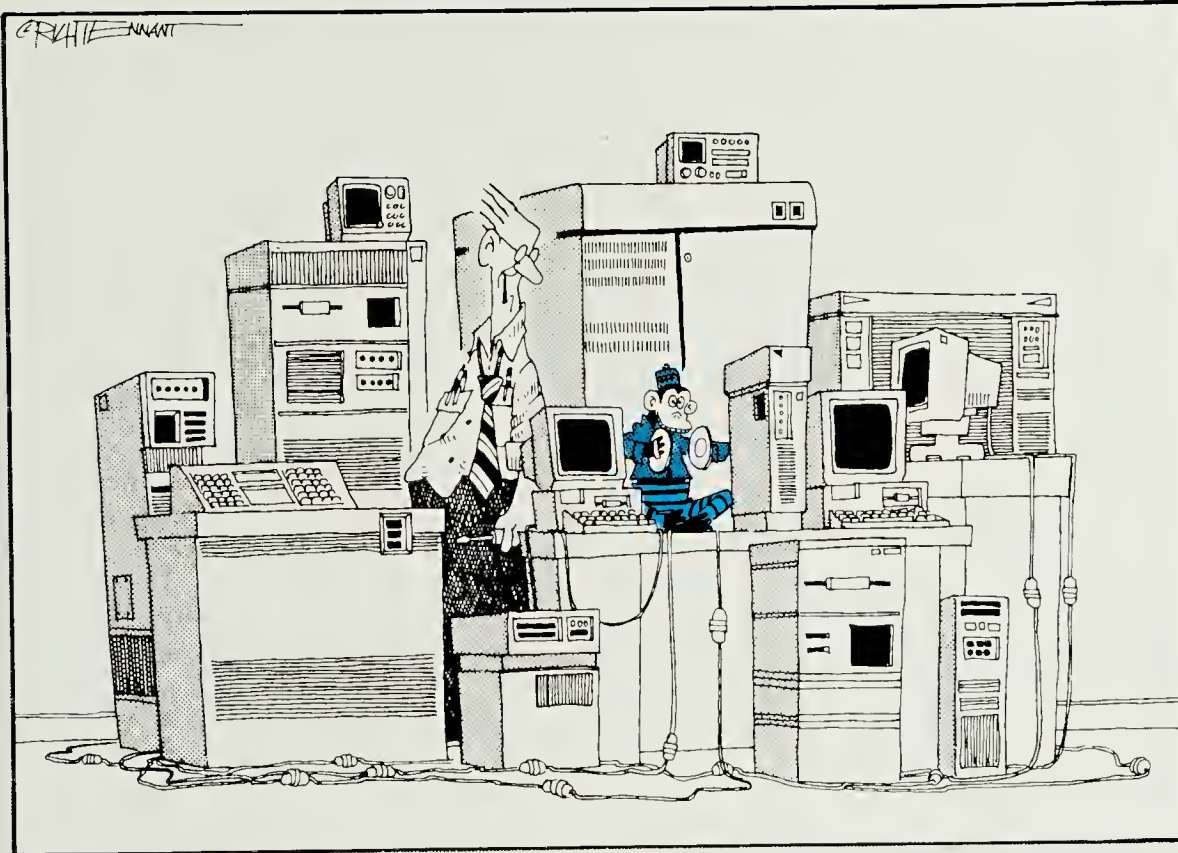
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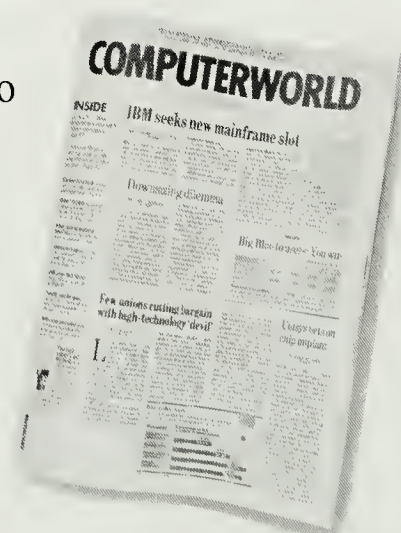
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